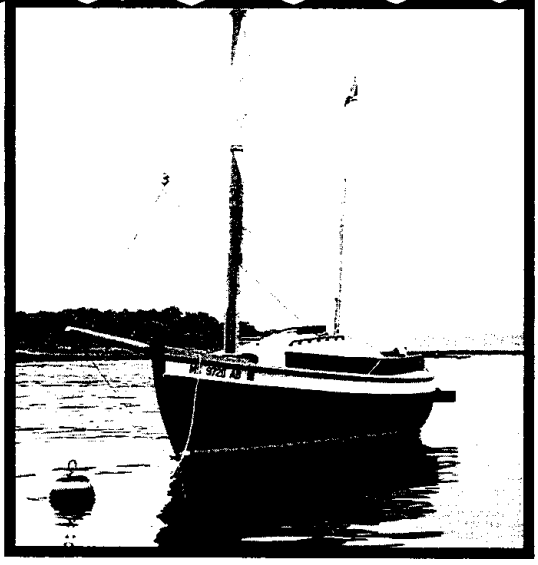
Overview of Coastal Subregions

chapter III



CHAPTER III. OVERVIEW OF COASTAL SUBREGIONS

Introduction

This chapter provides important background information on each of the five coastal subregions that comprise the larger Massachusetts Bays region. These five subregions and the communities they include are listed in Table III-1. Also listed are the five Local Governance Committees (LGCs) which represent their regions in the Bays Program, and which are working with MBP and Regional Planning Agency staff to facilitate CCMP implementation at the local and regional levels.

Table III-1. MBP Coastal Subregions

Upper North Shore Region
(Eight Towns & the Bay LGC)
Salisbury
Newburyport
Newbury
Rowley
Ipswich
Essex
Gloucester
Rockport

Salem Sound Region
(Salem Sound 2000 LGC)
Manchester-by-the-Sea
Beverly
Danvers
Peabody
Salem
Marblehead

Metro Boston Region
(Metro Boston LGC)
Swampscott
Lynn
Nahant
Saugus
Revere
Everett
Chelsea
Winthrop
Boston
Milton
Quincy
Braintree

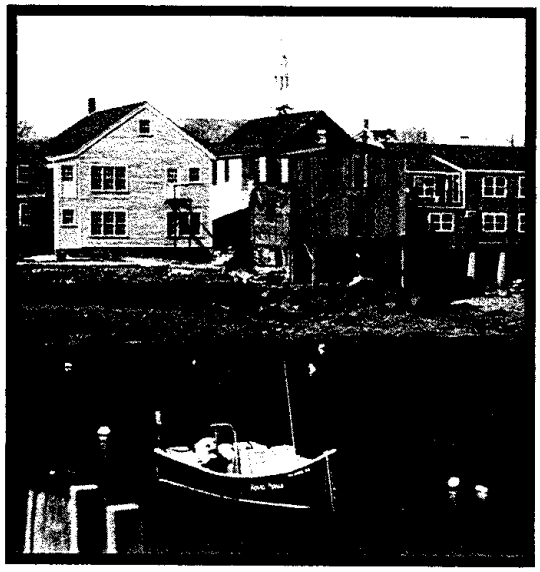
South Shore Region
(South Shore LGC)
Plymouth
Kingston
Duxbury
Marshfield
Norwell
Pembroke
Hanover
Scituate
Cohasset
Hull
Hingham
Weymouth

Cape Cod Region
(Cape Cod Coastal Resources Committee LGC)
Provincetown
Truro
Wellfleet
Eastham
Orleans
Brewster
Dennis
Yarmouth
Barnstable
Sandwich
Bourne

Each of five the subregions is described in terms of its major physical characteristics, population and economy, land use, water quality (including municipal sewage treatment methods), shellfish resources, public beaches, and other commercial and recreational uses. Information is also given on selected resource management issues important to each region - for example, rapid population growth, contaminated shellfish beds, or coastline erosion. Major coastal improvement projects and activities also are described, such as the MBP Mini-Bays projects, stormwater remediation activities, and harbor management planning. Finally, an extensive directory is given of regionally-important projects and programs, key contact persons, and sources of financial and technical assistance.

chapter III

Upper North Shore Region

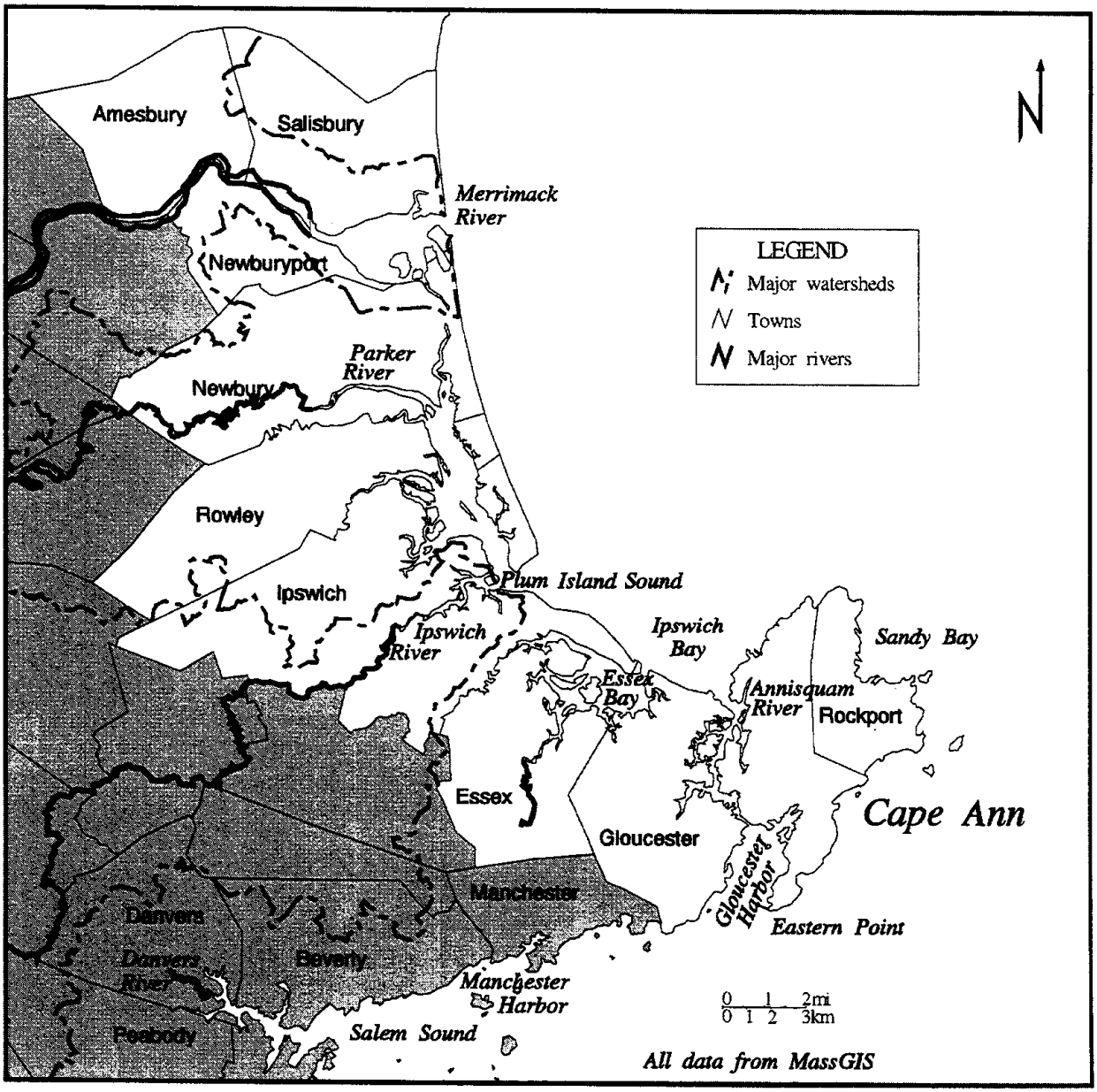


Upper North Shore Region

I Description of the Region

A. Map

The Upper North Shore region of the Massachusetts Bays Program includes the eight communities of Salisbury, Newburyport, Newbury, Rowley, Ipswich, Essex, Gloucester, and Rockport.



B. Physical Characteristics

1) Geology and Soils

The Massachusetts landscape was covered by glaciers 15,000 years ago. Many present-day geological features of the Upper North Shore (such as depositional beaches, bedrock outcroppings, drumlins, poorly drained soils, and numerous wetlands) reflect the region's glacial history. Salisbury, Newburyport, Newbury, Rowley, Ipswich, and Essex are characterized by long barrier beaches, estuaries, salt and freshwater marsh systems, and generally poorly drained soils. To the south and east, the Cape Ann communities of Gloucester and Rockport are characterized by rocky headlands and shallow soils covering ledge.

2) Description of the Coastline

The Upper North Shore coastline is dominated by long, sandy beaches backed by extensive estuaries in the north, and rocky beaches with small coves in the south. Salisbury Beach, a coarse sand barrier beach, stretches from the Massachusetts/New Hampshire border south to the mouth of the Merrimack River. Plum Island, a nine mile long barrier island sheltering Plum Island Sound, extends from the mouth of the Merrimack south to the mouth of the Ipswich River. Crane Beach (which begins south of the mouth of the Ipswich River) and Coffin Beach (which begins east of the Essex Bay inlet) run south and east, protecting the important estuarine resources of Essex Bay. All told, nearly 20,000 acres of coastal wetlands are shielded by Salisbury, Plum Island, and Crane Beaches. Cape Ann's coastline, which extends eastward from the Annisquam River, is characterized by rocky headlands with intermittent stretches of sand or gravel "pocket" beaches. The rocky headlands are erosion resistant and the shoreline has remained virtually stationary through time.

3) Watersheds and Important Tributaries

The region contains four major watersheds. The largest of these is the **Merrimack River**, which begins in the White Mountains of New Hampshire and drains extensive portions (5,010 square miles) of New Hampshire and Massachusetts. The mouth of this 116-mile river broadens into an expansive estuary that is shared by the communities of Salisbury and Newburyport. The Merrimack River is used extensively for both drinking water and wastewater disposal. The once-serious industrial point source pollution of the past has been largely abated, leaving municipal sewage treatment plant discharges (including combined sewer overflows) and nonpoint sources as the major contributors to the Merrimack's current water quality problems.

The **Parker River** drains 66 square miles in portions of nine communities, the foremost of which are Newbury, Rowley, and Georgetown. Beginning in freshwater wetlands in West Boxford, the Parker River flows in an easterly direction to Newbury, where it empties into Plum Island Sound. Major tributaries to the Parker River and Plum Island Sound include the Mill, Little, Egypt, Rowley, and Eagle Hill Rivers. Historically, water quality in the Parker River has been good, but the river is now under stress from increasing development in once-rural communities.

The **Ipswich River** originates in Burlington, MA and drains 155 square miles before emptying into Plum Island Sound at Ipswich. Its watershed is approximately 24 miles long and 6 miles wide and includes portions of 22 communities. As with many coastal streams, the Ipswich River's surrounding topography is generally characterized by low-lying land interspersed with slow-draining swamps and marshes. The Ipswich River is an important source of drinking water and outdoor recreation. With the exception of selected headwater areas (e.g., Burlington and Wilmington), the river's water quality is generally good until the river passes through the Town of Ipswich, where it picks up contaminants from urban runoff and septic systems.

The estuarine portions of the Parker River and Ipswich River watersheds, as well as the Castle Neck River, Essex River, and Essex Bay, are located within the Parker River/ Essex Bay Area of Critical Environmental Concern (ACEC). Designated in 1979, this is the only ACEC located on the Upper North Shore, but is the largest ACEC in the Commonwealth - approximately 25,500 acres. The ACEC is located in the towns of Essex, Gloucester, Ipswich, Newbury, and Rowley.

The **North Coastal Basin** includes the communities of Essex, Gloucester, Rockport, and northern Salisbury. This basin is characterized by small aquifers and streams whose yields are generally insufficient to meet municipal water supply needs.

C. Economic and Demographic Characteristics

The eight Upper North Shore communities differ in their economic and demographic structures. However, all depend on the diversity and vitality of the area's coastal resources to bolster their economies and provide a desirable quality of life. The communities support a broad array of marine-related industries, including commercial and recreational fishing (finfishing, lobstering, and shellfishing), tourism, whale watching, and boating. The following chart highlights two of the region's important fisheries (lobster and shellfish).

Upper North Shore Lobster and Shellfish Landings
(Note: lobster landings are combined for Newbury/Newburyport and Ipswich/Rowley)

Community	1993 Commercial Lobster Landings Pounds	Economic Value	1993 Reported Shellfish Landings Bushels	Major Species
Salisbury	18,828	$54,789	0	-
Newburyport			0	-
Newbury	65,149	189,584	5,900	soft shell clam
Rowley			227	soft shell clam
Ipswich	42,696	124,245	2,967	soft shell clam
Essex	4,146	12,065	4,805	soft shell clam
Gloucester	1,603,492	4,666,162	3,489	soft shell clam
Rockport	374,024	1,088,410	0	-
Region	2,108,335	$6,135,255	17,388	

Source: *DMF Data*

Many Upper North Shore residents commute to Boston, while many others engage in commerce closer to home. Most of the communities show heavy population increases during summer months as tourists flock to the beaches, seaside restaurants, and art and antique shops. The chart below highlights some of the demographic differences between the eight communities in the region.

Upper North Shore Demographics

Community	Area (sq. mi.)	1990 Pop. Density (/sq. mi)	Year-Round Population 1970	1980	1990	Est. Summer Pop. Inc.*	1990 Avg. Household Income
Salisbury	16.07	428	4,179	5,972	6,882	H	$35,679
Newburyport	9.05	1,803	15,807	15,900	16,317	M	$38,618
Newbury	24.62	228	3,804	4,529	5,623	M	$44,068
Rowley	18.75	237	3,040	3,867	4,452	-	$47,967
Ipswich	32.43	366	10,750	11,158	11,873	M	$42,386
Essex	13.20	247	2,670	2,998	3,260	M	$46,304
Gloucester	27.84	1,031	27,941	27,768	28,716	M	$32,690
Rockport	7.03	1,064	5,636	6,345	7,482	H	$35,195
Region	148.99	568	73,827	78,537	84,605		

* H = High; M = Moderate; L= Low; "-" = None

Source: *1990 U.S. Census Data*

D. Land Use

The Upper North Shore region includes two cities (Newburyport and Gloucester) and six towns. Newburyport, Gloucester, and to a lesser extent Ipswich, contain the largest industrial areas in the region. The communities north of Cape Ann have substantial acreages of tidal marsh, estuary, freshwater wetland and barrier beach. Portions of several towns (Rowley, Newbury, Essex, Ipswich, Salisbury) are still rural in nature and support farming activities. These rural towns grew rapidly in the 1970's and early 80's, creating an overload on community planning and the delivery of services. However, most of the towns still contain considerable developable open land.

E. Water Quality

Overall, water quality in the region is fairly good. The area is not heavily industrialized, and except for a few municipal sewage treatment plant outfalls, coastal point source pollution is not a major concern. Communities have the opportunity to exercise considerable control over coastal pollution, since many smaller streams and rivers remain within municipal boundaries. In spite of this, all of the region's streams are impacted to some degree by nonpoint source pollution. The Merrimack River, while much improved in recent years, is still sufficiently polluted by upstream and local sources to keep all productive Salisbury and Newburyport shellfish beds closed, and occasionally cause water quality criteria for selected metals to be exceeded. In the late 1980s, the Merrimack River was recognized as a critically important regional resource and became the focus of an Environmental Protection Agency watershed initiative. The goal of the Merrimack River Initiative (MRI) is to develop and implement a Watershed Management Plan, similar to the Massachusetts Bays CCMP, that will restore and maintain the physical, chemical, and biological integrity of the river and its watershed to meet existing and future multiple uses and to protect its natural resources. Because the Merrimack River has been the subject of MBP-funded research (Menzie-Cura and Associates, 1991; Menzie-Cura and Associates, 1995),

1992 DEP Water Quality Ratings for Upper North Shore's Major River Basins and Harbors

River Segment	Use * Class	Status**	Pollutants - Sources
Merrimack River Basin			
NH state line to Little River, Haverhill (4 segments)	B	NS	pathogens, nutrients, metals, pH - CSOs, urban runoff, municipal & industrial point sources, agriculture
Little River to Indian River, West Newbury	SB	NS	unionized ammonia, thermal modification, pathogens - CSOs, urban runoff, municipal point sources
Indian River to mouth	SA	NS	pathogens - urban runoff, municipal point sources
Plum Island River	SA	PS	pathogens - unknown
Parker River Basin			
Source to Central St., Newbury	B	S	
Central St. to mouth	SA	Not assessed	
Eagle Hill River	SA	PS	pathogens - source unknown

continued

1992 DEP Water Quality Ratings for Upper North Shore's Major River Basins and Harbors (continued)

River Segment	Use * Class	Status**	Pollutants - Sources
Parker River Basin (continued)			
Paine Creek	SA	PS	nutrients, pH, metals, pathogens, toxics-landfills, unknown
Rowley River	SA	PS	pathogens, unknown
Bull Brook	B	S/T	pesticides, nutrients, siltation, organic enrichment/DO, pathogens - agriculture, natural
Ipswich River Basin			
Source to Sylvania Dam, Ipswich	B	S	
Sylvania Dam to mouth	SA	NS	pathogens - septic tanks, non-urban runoff, unknown
Miles River	B	S/T	metals, toxics, nutrients - recreation, landfills
North Coastal Basin			
Essex River	SA	NS	pathogens, organic enrichment/DO - septic tanks, recreation, agriculture, natural
Annisquam River	SA	NS	pathogens - CSOs, recreation, urban runoff, unknown
Rockport Harbor	SB	NS	pathogens - source unknown
Gloucester Harbor	SB	NS	pathogens - CSOs, source unknown, urban runoff / storm sewers, industrial point sources

* **"Use Classes"** are State goals for the river:
S prefix denotes coastal or marine segment
A = public water supply, fishable, swimmable
B = fishable, swimmable
C = fishable

** **Status Codes:**
S = supports all indicated uses
S/T = supports all uses, but is threatened
PS = supports some uses
NS = supports no uses

Source: *DEP 305(b) Report*

which has identified the Merrimack as a significant source of contaminants to Massachusetts Bay, it is important that both the management plans of the MBP and the MRI recognize their mutual goals and the efforts needed to obtain those goals.

The Ipswich River is relatively clean until it passes through the Town of Ipswich, where it picks up heavy loads of bacterial pollutants before entering Ipswich Bay. The Parker River also is still relatively clean, but periodically has elevated pollutant levels due to development and agricultural activity (e.g., runoff from horse farms) in its basin. Many smaller coastal streams contribute significantly to shellfish bed closures. The major causes of the area's nonpoint source pollution are: failing septic systems (contributing bacteria, nutrients, and pathogens), stormwater runoff (carrying contaminants from a variety of sources including failing septic systems, road emissions, animal wastes, fertilizers, and pesticides), and poorly functioning sewer systems.

Salisbury, Newburyport, Ipswich, Gloucester and Rockport have municipal sewage treatment systems which service parts of the communities. It is surprising, then, that only a little more than 50 percent of Upper North Shore homes are sewered. The remaining homes rely on on-site sewage treatment and disposal systems (septic systems and cesspools), many of which pre-date the Title 5 regulations of the State Environmental Code. The following information is summarized from a 1995 report titled "The Status of Municipal Wastewater Treatment and Energy-Producing Facilities Discharging to Coastal Waters in Massachusetts" (Richard Zeroka, MCZM). Please refer to this report for more information on coastal municipal sewage treatment facilities.

1995 Upper North Shore Municipal Sewage Treatment Information

Community	Population est. Total (1987)	Population est. Served	Current level of treatment	Design Flow - MGD	Actual Average Flow - MGD	CSOs	Effluent discharge	Sludge disposal	Primary source of flow
Salisbury	6,882	>5,000	secondary+ advanced	1.3	0.34	no	tidal creek (Merrimack River)	land application	domestic
Newburyport	16,317	15,500	secondary	3.4	2.1	no	Merrimack River	hauled to Fall River	domestic, commercial, industrial
Newbury	5,623	—	onsite	—	—	—	—	—	—
Rowley	4,452	—	onsite	—	—	—	—	—	—
Ipswich	11,373	6,418	secondary	2.0	1.1	no	Greenwood Crk (Ipswich River)	composting	domestic, industrial
Essex	3,260	—	onsite	—	—	—	—	—	—
Gloucester	28,716	?	primary	7.2	3.4	yes	Gloucester Harbor	local composting; out of state	domestic, commercial, industrial
Rockport	7,482	4,000	secondary	0.8	0.65	no	Rockport Harbor	land application	domestic, commercial
Region	84,105	30,918							

A. Shellfish Beds

Upper North Shore Shellfish Beds and Status as of 07/01/95

	Status*	Open Acres	Closed Acres**
Amesbury			
N2.0	P		37
Essex			
N7.0	CA	689	
N7.2	P		73
N7.3	P		29
N7.4	P		36
N7.5	CA	142	
N.6	CA	189	
Gloucester			
N7.0	CA	202	
N7.1	P		5
N7.6	CA	250	
N8.0	A		2,118
N9.0	P		1,472
N9.1	P		108
N9.10	P		50
N9.11	P		48
N9.12	CA	98	
N9.13	P		19
N9.14	P		58
N9.15	P		17
N9.16	CA	8	
N9.17	P		7
N9.18	P		14
N9.2	P		3
N9.3	P		34
N9.4	P		9
N9.5	CA	20	
N9.6	CA		11
N9.7	CA	370	
N9.8	P		97
N9.9	CA	7	
N10.0	P		8,438
N12.0	MC		2,728
N13.0	MC		7,651
N14.0	MC		6,020

	Status	Open Acres	Closed Acres**
Ipswich			
N3.0	A	5,776	
N4.0	CA	1,660	
N4.3	CA	23	
N4.4	CA	235	
N5.0	P		214
N5.1	P		51
N5.2	P		4
N5.3	P		13
N5.4	P		30
N5.5	P		22
N5.6	P		25
N5.7	P		28
N6.0	P		4,871
N7.4	P		36
N7.5	CA	88	
N7.6	CA	359	
N10.0	P		272
Newbury			
N2.0	P		253
N3.0	A	8,406	
N4.0	CA	641	
N4.1	CA	159	
Newburyport			
N2.0	P		1,413
N3.0	A	960	
Rockport			
N11.0	MC		28,332
N11.1	P		43
Rowley			
N3.0	A	2,275	
N4.0	CA	920	
N4.1	CA	29	
N4.2	CA	161	
N4.3	CA	6	
Salisbury			
N1.0	P		8,951
N1.1	P		48
N1.2	P		31
N2.0	P		1,043

*Status Code:
A=Approved
CA=Conditionally Approved
CR=Conditionally Restricted
P=Phohibited
MC=Management Closure

** Acres Calculation: is for the overall surface water area at high tide within the defined growing area. Outer coastal (beach-side) areas generally have clean water but are not very productive; these areas, usually defined as extending to the 3 mile line, are very large in comparison to the productive, more often closed estuarine areas.

Source: *DMF Data*

The Upper North Shore is famous for its soft shell clams. While coastal pollution has significantly curtailed the region's use of this valuable resource, shellfishing is still equated with a high quality of life. Some open ocean areas remain approved to shellfish harvesting; however, all *productive* shellfish beds on the Upper North Shore are currently closed or only conditionally opened. The Merrimack estuary clam flats (Salisbury and Newburyport), which once yielded annual harvests of over 100,000 bushels, have been essentially closed since 1925. (Shellfish beds are closed in response to high counts of fecal coliform bacteria, which indicate the probable presence of harmful pathogens. Fecal coliforms are found in human and animal waste; they enter streams and the coastal area through failing septic systems, poorly functioning sewer systems, and stormwater runoff.)

B. **Beaches**

The Upper North Shore is blessed with many beaches. The tables below list coastal frontage and area beaches by community.

Upper North Shore Coastal Frontage by Community

Community	Total miles of coastal frontage	Miles of coastal frontage publicly owned	Percent of coastal frontage publicly owned
Salisbury	6.90	4.92	71.3
Newburyport	7.11	0.80	11.3
Newbury	12.69	6.89	54.3
Rowley	8.20	6.72	82.0
Ipswich	22.99	18.55	80.7
Essex	3.03	1.52	50.2
Gloucester	47.19	4.74	10.0
Rockport	14.74	12.33	83.6
Region	122.85	56.47	46.0

Upper North Shore Beaches

Community	Beach Operator
Salisbury	
Town Beach	Salisbury
State Reservation	Department of Environmental Management (DEM)
Newburyport	
Plum Island Beach	Newburyport US Fish & Wildlife
Newbury	
Plum Island Beach	US Fish & Wildlife
Rowley	
Plum Island Beach	US Fish & Wildlife
Ipswich	
Plum Island Beach	US Fish & Wildlife
Plum Island State Park	DEM
Crane Beach	Trustees of Reservations
Great Neck Beach	Great Neck Association
Little Neck Beach	Feofees of Little Neck
Clammers (Pavilion) Beach	Ipswich

Community	Beach Operator
Gloucester	
Coffins Beach	private
Wingaersheek Beach	Gloucester
Plum Cove	Gloucester
Niles Beach	Gloucester
Pavilion Beach	Gloucester
Cressy Beach	Gloucester
Magnolia Beach	private
Good Harbor Beach	Gloucester
Rockport	
Long Beach	Rockport
Cape Hedge Beach	Rockport
Pebbly Beach	Rockport
Old Garden Beach	Rockport
Town Beach	Rockport
Front Beach	Rockport
Back Beach	Rockport

C. Other Commercial or Recreational Uses

The Upper North Shore coastal area offers many commercial and recreational opportunities. Gloucester, with its major fishing port and fish processing plants, is the fishing capital of the region. Many lobster boats are sheltered in Rockport, Gloucester, and Ipswich. Recreationists fish for anadromous, near coastal, and deep water species. All communities offer opportunities for pleasure boating; charter fishing, river cruises, and whale watching tours are available in several. Barrier beaches and their intercoastal areas provide opportunities for birding, wildlife observation, and hunting. Each community has seafood businesses and restaurants which utilize the local fish and shellfish catches; each also has an active tourism industry which relies heavily on the nearby coastal attractions.

III Community Resource Management Surveys

This section contains answers to selected questions from recent EOEA surveys. The answers are summarized here to provide a sense of the steps that Upper North Shore communities are taking to protect their resources.

Upper North Shore Resource Management Survey Answers

	Salisbury	Newburyport	Newbury	Rowley	Ipswich	Essex	Gloucester	Rockport
Wetland and Habitat Protection								
Has the community:								
- issued local wetlands guidelines in addition to the Wetlands Protection Act?	N	N	N	N	Y	N	Y	Y
- delineated coastal & inland wetlands?	N	N	N	N	N	N	Y	N
Groundwater Protection								
Does the community have:								
- stormwater control regulation(s)?	N	N	N	Y	Y	Y	Y	N
- Board of Health regulation(s) stricter than Title V?	N	N	N	N	Y	N	Y	N
- septic system inspection program?	N	N	N	N	N	N	N	N
- septic system upgrade program?	N	N	N	N	N	N	N	N
- septic system pumping program?	N	N	N	N	N	N	N	N
Surface and Coastal Water Protection								
Does the community have:								
- flood plain maps (FEMA)	Y	Y	Y	Y	Y	Y	Y	Y
- flood plain zoning	Y	Y	Y	Y	Y	Y	Y	Y
- boat pumpout facilities	Y	Y	N	N	N	N	Y	N
- subdivision stormwater management regulations	N	N	N	Y	Y	N	N	N
General Environmental Protection								
Do these boards have professional staff?								
- Planning Board	N	Y	N	N	Y	N	Y	N
- Conservation Commission	Y	Y	N	Y	Y	N	Y	N
- Board of Health	Y	Y	Y	Y	Y	Y	Y	Y

IV Significant Resource Management Issues

Shellfish bed closures are of major concern to most communities in this region. All productive Upper North Shore shellfish beds are closed either full time or following rain events. The beds are closed by the Division of Marine Fisheries (DMF) in response to unacceptably high levels of fecal coliform bacteria. Important sources of the bacteria include malfunctioning on-site septic and municipal sewerage systems, polluted stormwater, boat wastes, and, in some cases, domestic and wild animals wastes. Solutions to the shellfish bed problem are well documented. However, the implementation of these solutions is very difficult, as strong commitment by communities and individuals is required. Of related concern to area shellfishermen is a potential shortage of **depuration capacity** for the cleansing of shellfish harvested from conditionally restricted areas. Shellfish from conditionally restricted areas live in waters with relatively higher fecal coliform levels, can only be dug by "master diggers", and must be depurated (a filtering process) prior to sale. Some area shellfish beds could potentially be upgraded from prohibited to conditionally restricted, but a possible shortage of depuration facilities may create a problem. The state's only depuration facility, run by the Division of Marine Fisheries, is located on the northern tip of Plum Island (Newburyport). This facility currently accepts clams only from the Boston Harbor area.

Coastal erosion is of special concern to Salisbury. Salisbury Beach has many oceanfront homes and businesses, and has experienced severe erosion during recent storms. The town is encouraging the planting of dune grass and installation of snow fencing by beachfront residents, and built a sacrificial dune at the southern end of the beach during the summer of 1994. The northern end of Plum Island (Newburyport and Newbury) also is heavily developed, but has not experienced major erosion problems in recent years.

Growth management and comprehensive planning tools are needed in all of the Upper North Shore communities. This need goes hand-in-hand with the need for greater **technical assistance** at the community level. Most of the communities are served by volunteer planning, health, and conservation boards with inadequate staff support. Conservation Commissions and Boards of Health in particular are limited in effectiveness because they often have only part-time agents. This is a problem which, unfortunately, only additional funds can remedy.

V Coastal Management and Improvement Activities

A. Massachusetts Bays Program Mini-Bay Project, Demonstration Projects, and Bays Action Grants

Massachusetts Bays Program demonstration projects in the region have been administered primarily through Eight Towns and the Bay (8T&B), the region's MBP Local Governance Committee, and the Plum Island Sound Mini-Bay Project, conducted by Massachusetts Audubon Society: North Shore Office. Eight Towns and the Bay has used MBP funding to initiate a wide variety of activities, including:

- Establishing community-based, volunteer Water Quality Task Forces to encourage grass roots participation in the Massachusetts Bays Program. 8T&B also developed a "Workbook" to help community groups assess nonpoint source pollution in their towns. To date, the Task Forces have conducted a variety of water quality monitoring and educational projects in their communities.

- Sponsoring a septic system assessment grant program for 8T&B communities. The winner of the 1995 grant - the Essex Board of Health - performed a survey of all septic systems in town. Ipswich, a runner-up in the grant contest, was later awarded DEP 604(b) funds for its stormwater and septic system pollution assessment proposal.

- Sponsoring workshops focusing on several coastal issues (e.g., stormwater pollution, salt marsh restoration, shell-fish and finfish aquaculture).

- Providing funding for an assortment of smaller projects including: test well monitoring in Gloucester; development of an Open Space Plan for Rockport; restoration of a small freshwater pond in Essex; water quality monitoring in Rowley; and inventorying of restricted tidal creeks in all 8T&B communities.

- Assisting 8T&B communities in applying for various state environmental planning, assessment, and remediation grants. To date, projects have been funded in Gloucester, Ipswich, and Rowley.

MBP Bays Action Grants have also promoted coastal action and awareness in the region. Grants have been awarded for a variety of activities including: water quality monitoring in Ipswich; an innovative stormwater technology demonstration in Rowley; and whale paintings on the Newburyport boardwalk by school children.

B. Other Government Programs

Marinas in Newburyport and Gloucester have both recently received state grants for boat pump-out facilities. The Town of Rockport hopes to receive funding from the same grants program.

The Merrimack Valley Planning Commission, in collaboration with the Town of Ipswich and the City of Gloucester, is conducting soft shell clam aquaculture demonstration projects on non-productive tidal flats in the Eagle Hill River (Ipswich) and the Little River (Gloucester).

C. Citizen Group Efforts

The Upper North Shore is fortunate to have a number of active citizen groups and nonprofit environmental organizations working in concert to restore and protect water quality and habitat. The Eight Towns and the Bay Committee is the newest group to the area. It was established in 1992 to promote local and regional coastal water quality initiatives, and is comprised of citizens appointed by the chief elected officials in each of the eight member communities. Other regional environmental organizations include: the Merrimack River Watershed Council, the Ipswich River Watershed Association, the Parker River Watershed Association, Massachusetts Audubon: North Shore Office, the Essex County Greenbelt Association, the Trustees of Reservations, and the Bay Circuit Alliance.

Directory of Upper North Shore Coastal Projects, Programs, and Sources of Assistance

State/Federal Programs and Agencies	Contact Person and Telephone Number	Project or Program Description
• Massachusetts Bays Program	Diane Gould, Executive Director (617) 727-9530	Natural Estuary Program - provides planning, technical and financial assistance for the protection of Massachusetts and Cape Cod Bays. Partnership of state/federal and municipal governments.
• Shellfish Bed Restoration Program (MBP, Div. of Marine Fisheries, DEP, Soil Conservation Service)	Deirdre Kimball, Coordinator (617) 727-9530	Collaborative effort by Mass Bays Program, DMF, DEP, and NRCS to remediate storm drain pollution of priority shellfish beds.
• ACEC Program (Area of Critical Environmental Concern)	Leslie Luchonok, ACEC Prog. Mgr. (617) 727-3160	ACEC status provides additional protection to critical resource areas, and creates an ecosystem-based planning and management framework for state and local actions.
• Partners for Wildlife Program (US Fish & Wildlife Service)	Robert Scheirer, Priv. Lands Coord. (603) 225-1411	A federal program providing financial and technical assistance to landowners for wetlands restoration projects.
• Riverways Program (MA Dept. of Fisheries, Wildlife and Env. Law Enforcement)	Maria van Dusen, Joan Kimball (617) 727-1614	Riverways offers guidance documents and technical assistance on local river protection efforts.
• Natural Resources Conservation Service/Community Assistance Unit	Marc McQueen (508) 295-1481	This new technical team helps communities address nonpoint source pollution problems.
• Wetlands Conservancy Program (Department of Environmental Protection)	Charles Costello (617) 292-5704	This state program is charged with mapping coastal and inland wetlands.
• Wetlands Restoration and Banking Program	Christy Foote-Smith, Director (617) 727-9530	A new, statewide EOEA program targeted towards restoring degraded wetlands.
Regional Government Agencies/Programs		
• Eight Towns and the Bay (Upper North Shore Local Governance Committee)	Lisa Nicol, MVPC (508) 374-0519	Regional committee comprised of community appointees. Purposes: information sharing, promoting local and regional actions.
• MBP Plum Island Sound Minibays Project	Andrea Cooper MA Audubon: NS (508) 972-1122	MBP-funded study of coastal pollution in Ipswich, Rowley, and Newbury. Includes biological & land use studies and public outreach.

continued

Directory of Upper North Shore Coastal Projects, Programs, and Sources of Assistance

Regional Government Agencies/Programs	Contact Person and Telephone Number	Project or Program Description
• Department of Environmental Protection	Lawrence Gil, Office of Watershed Management (617) 292-5884	Team leader for North Coastal Basin team.
	Elaine Hartman, Office of Watershed Management	Team leader for Ipswich River Basin team.
	Joan Beskinis, Office of Watershed Management	Team leader for Parker River Basin team.
• Coastal Zone Mgmt. Office: North Shore regional assistance	North Shore Coord. (508) 281-7932	CZM develops state coastal zone policy, and monitors coastal activities, and provides technical assistance on broad range of coastal issues.
• Division of Marine Fisheries	David Chadwick, Fisheries Biologist Newburyport Shellfish Plant (508) 465-3553	The Newburyport biologists test North Shore shellfishing areas for pathogens and PSP.
• Essex County Mosquito Control Project (ECMCP)	Walter Montgomery	ECMCP has expertise in saltmarsh restoration work (Open Marsh Water Management).
• Merrimack River Initiative	Carolyn Jenkins NEIWPCC (617) 658-0500 x235	A federally funded, bi-state, public/private initiative designed to foster environmental improvements within the Merrimack River corridor.
• Merrimack Valley Planning Commission (MVPC)	Alan Macintosh, Env. Program Mgr. (508) 374-0519	Regional Environmental Planning.
• Metropolitan Area Planning Council (MAPC)	Martin Pillsbury, Water Resources Planner	Regional Environmental Planning.
	Joan Blaustein, Land Resource Planner (617) 451-2770	(Can also assist with bikeways and pathways planning.)
• Essex County Regional Services	Tia Costello, Coordinator (508) 741-0201	Recycling, composting, household hazardous waste collection, solid waste management, GIS.
	Thomas O'Leary, County Planner	

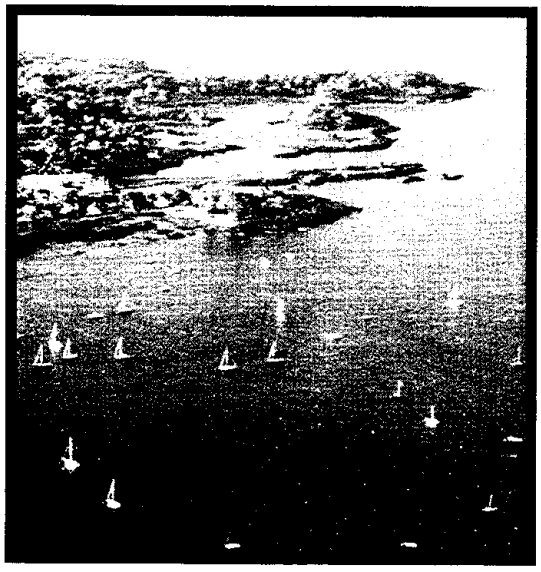
continued

Directory of Upper North Shore Coastal Projects, Programs, and Sources of Assistance

Regional Nonprofit Agencies	Contact Person and Telephone Number
• Essex County Greenbelt Association (ECGA)	Ed Becker, Executive Director (508) 768-7241
• Ipswich River Watershed Association (IRWA)	Kerry Mackin, Executive Director (508) 887-8589
• Massachusetts Audubon: North Shore Office/Mill River Nonpoint Source Reduction Implementation Project	Andrea Cooper, Robert Buchsbaum (508) 927-1122
• Merrimack River Watershed Council (MRWC)	Ralph Goodno, President (508) 681-5777
Local Efforts	
• Essex Water Quality Task Force	Stephan Gersh, Chairman (508) 768-7822
• Gloucester sewering project, BOH septic surveys	Dan Ottenheimer, Health Agent (508) 281-9798
• Ipswich Coastal Pollution Control Committee	Wayne Castonguay, Chairman (508) 281-9275
• Merrimack Estuary Monitoring Project (8T&B/MRWC)	Marea Gabriel, MRWC (508) 681-5777
• Rockport Water Quality Task Force	Ruth Perrault, Chairperson (508) 546-3896
• Rowley Water Resource Committee	Fran Sculley, Chairperson (508) 948-2141

chapter III

Salem Sound Region

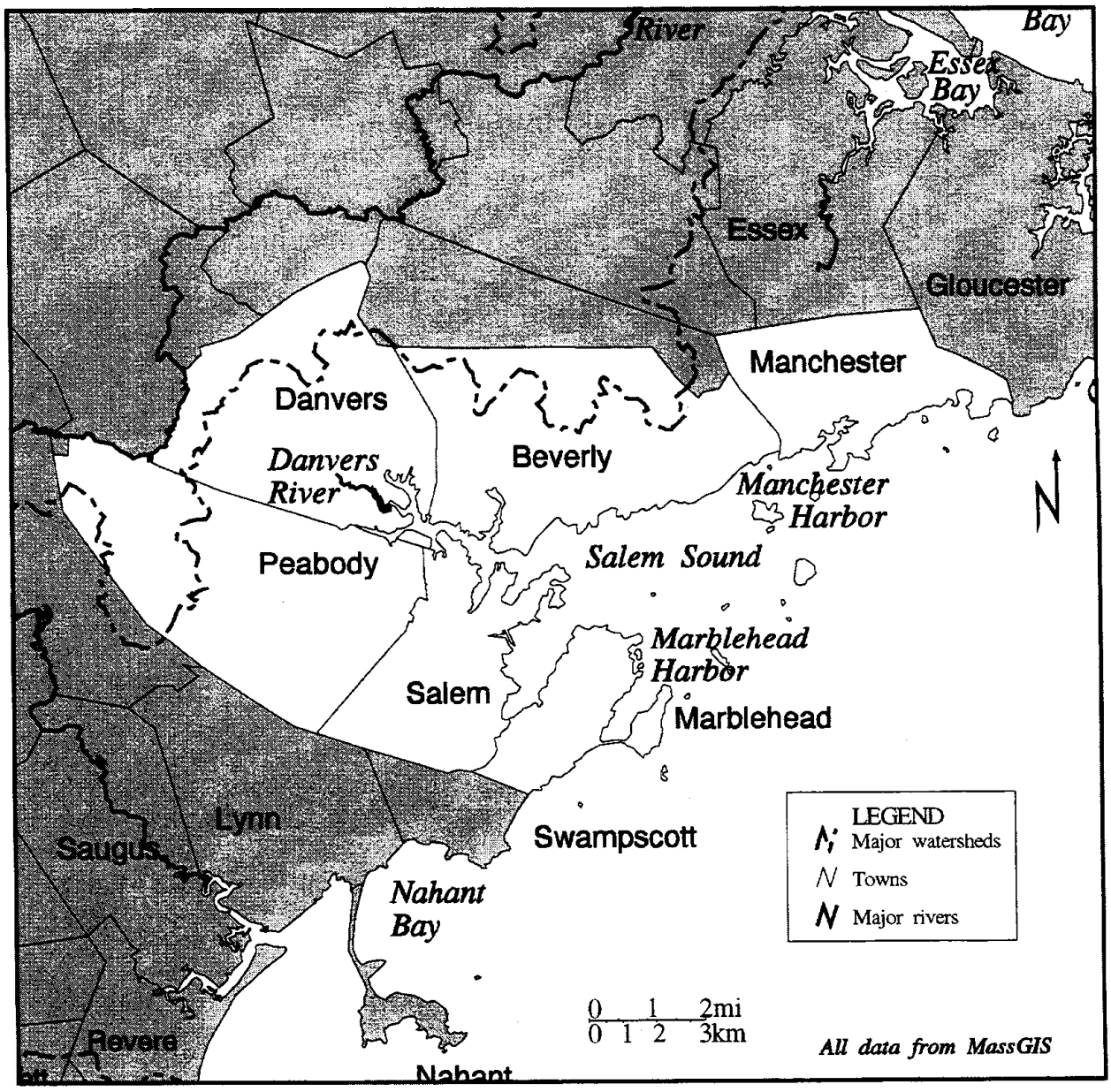


Salem Sound Region

I Description of the Region

A. Map

The Salem Sound region of the Massachusetts Bays Program consists of Manchester-by-the-Sea, Beverly, Danvers, Peabody, Salem, and Marblehead.



B. Physical Characteristics

1) Geology and Soils

Manchester-by-the-Sea predominantly consists of exposed rocky headlands. From Chubb Point (Manchester-by-the-Sea) to Beverly Harbor and around through Marblehead Harbor, the beach complexion changes to coarse sand and gravel with intermittent exposures of rocky headlands.

Much of the watershed in Manchester-by-the-Sea and Beverly and South Salem consists of the Chatfield-Hollis-Rock outcrop association, which generally has loamy soils formed in glacial till with areas of exposed bedrock. Areas in Beverly, Peabody, Salem and Marblehead which are densely settled are classified as Urban soil (i.e., disturbed soil that has been excavated or built upon). Danvers, West Peabody and small areas of Beverly are classified as Merrimac-Hinckley-Urban soil association which has loamy and sandy soils disturbed by urban activities.

2) Description of the Coastline

The portion of Manchester-by-the-Sea which drains to Salem Sound includes the area from Smith's Point to Chubb Point, and is characterized by mixed rocky and sandy beach coastline. The eastern portion of Beverly has several large sections of sandy beach which are erosional zones, with few marshes. The downtown areas of Beverly, Salem and Danvers are generally developed on the waterfront, but have some pockets of marshes remaining in the headwaters and estuarine zone as well as a few sandy beaches. The coastlines of Salem Willows and Winter Island, as well as Marblehead and Marblehead Neck, are mixed rock outcroppings interspersed with sandy beaches.

3) Watershed and Important Tributaries

The major tributary to Salem Sound is the Danvers River, with its tributaries of the Bass, Porter, Crane, and Waters Rivers. Other tributaries to Salem Sound include the Forest, South, and North Rivers. The Sound watershed is located almost exclusively in the bordering communities of Manchester-by-the-Sea, Beverly, Danvers, Peabody, Salem and Marblehead. A small amount of land in Essex, Wenham, Lynn and Swampscott also drains to Salem Sound.

C. Economic and Demographic Characteristics

Salem Sound supports year-round commercial fishing from all of its harbors. In the summer months, recreational use of the Sound increases dramatically. Sailing and recreational boating are very popular, as are use of the area's numerous beaches and parks, fishing, tourist boat excursions, and simply walking along the water's edge. Several of the communities with cottages along the shoreline and on islands experience small population increases during summer months.

Salem Sound Lobster and Shellfish Landings

Community	1993 Commercial Lobster Landings Pounds	Economic Value	1993 Reported Shellfish Landings *Bushel's	Major Species
Manchester-by-the-Sea	168,280	$489,694	0	-
Beverly	578,995	$1,684,875	0	-
Danvers	64,219	$186,877	0	-
Peabody	N/A		0	-
Salem	6,033	$17,556	0	-
Marblehead	451,691	$1,314,420	0	-
Region	1,269,218	$3,693,424	0	

* All Salem Sound waters are closed to shellfishing

Source: *DMF Data*

In terms of population, Danvers, Peabody, Salem and Marblehead have experienced slight decreases since 1970. Beverly has remained even and Manchester-by-the-Sea shows an increase. 1970, 1980, and 1992 population figures (from U.S. Census) are as follows:

Salem Sound Demographics

Community	Area (sq. mi.)	1990 Pop. Density (sa. mi.)	Year-Round Population 1970	1980	1990	Est. Summer Pop. Inc.	1990 Avg. Household Income
Manchester-by-the-Sea	7.9	674	5,151	5,424	5,410	M	$52,806
Beverly	15.4	2,474	38,348	37,655	38,378	-	39,063
Danvers	10.4	2,276	26,151	24,100	24,484	-	43,759
Peabody	16.4	2,869	48,080	45,976	47,387	-	44,952
Salem	8.1	4,702	40,556	38,220	37,567	-	40,777
Marblehead	4.5	4,408	21,295	20,126	20,423	L	53,333
TOTAL	62.8	2,766	179,581	171,501	173,649		

* H = High; M = Moderate; L= Low; "-" = None

Source: *1990 U.S. Census Data*

D. Land Use

Much of the coastline and watershed of Salem Sound is developed with few natural areas remaining. Waterfront development is mostly residential with some commercial establishments, a number of which are water dependent. Most of the watershed is residential with large industrial/ commercial areas in some cities.

E. Water Quality

All areas of Salem Sound are classified as the less stringent SB designation except for Marblehead Harbor, which has an SA classification. Currently, no part of Salem Sound including its harbors, tributaries, and the Sound itself supports its water quality classification. Commonly noted sources of pollution include urban runoff from storm drain systems, industrial waste, wastewater treatment plant discharges, and boat waste.

1992 DEP Water Quality Ratings for Salem Sound's Major River Basins & Harbors

River Segment	Use * Class	Status**	Pollutants - Sources
Bass River - headwaters to inlet of Shoe Pond, Beverly	B	PS	organic enrichment / DO, pathogens - source unknown, urban runoff / storm sewers
Bass River - inlet Shoe Pond to Danvers River	SB	PS	pathogens - source unknown, urban runoff / storm sewers
Danvers River	SB	NS	pathogens-source unknown, urban runoff / storm sewers, combined sewer overflow
Porter River	SB	NS	pathogens - source unknown, urban runoff / storm sewers
Crane River	SB	NS	pathogens - source unknown, urban runoff / storm sewers

continued

1992 DEP Water Quality Ratings for Salem Sound's Major River Basins & Harbors

River Segment	Use * Class	Status**	Pollutants - Sources
Crane Brook	B	NS	unionized ammonia, pathogens - source unknown, urban runoff / storm sewers
Waters River	SB	NS	pathogens - source unknown, urban runoff / storm sewers
North River	SB	NS	nutrients, organic enrichment/DO, pathogens - industrial point sources, source unknown, urban runoff / storm sewers
Goldthwait Brook	B	NS	pathogens, nutrients, organic enrichment/DO, unionized ammonia - urban runoff / storm sewers, source unknown, industrial point sources
Forest River	SB	NS	pathogens, organic enrichment/DO, nutrients, unionized ammonia - urban runoff / storm sewers, source unknown
Manchester Harbor	SB	NS	pathogens - septic tanks, recreational activities, source unknown, municipal point sources
Beverly Harbor	SB	NS	pathogens - CSOs, recreational activities, source unknown, urban runoff / storm sewers
Salem Harbor	SB	NS	pathogens - urban runoff / storm sewers, recreational activities, industrial point sources
Marblehead Harbor	SA	NS	pathogens - CSOs, urban runoff/storm sewers, source unknown, recreational activities

* **"Use Classes"** are state goals for the river:
S prefix denotes coastal or marine segment
A = public water supply, fishable, swimmable
B = fishable, swimmable
C = fishable

** **Status Codes:**
S = supports all indicated uses
S/T = supports all uses, but threatened
PS = supports some uses
NS = supports no uses

Source: *DEP 305(b) Report*

Each of the six Salem Sound communities is served by municipal or regional sewage treatment facilities. These communities historically have not contained a large number of combined sewer overflows (CSOs). Those that did exist have been, or are in the process of being, corrected. The following information is summarized from a 1995 report titled "The Status of Municipal Wastewater Treatment and Energy Producing Facilities Discharging to Coastal Waters in Massachusetts" (Richard Zeroka, MCZM). Please refer to this report for more information on coastal municipal sewage treatment facilities.

1995 Salem Sound Municipal Sewage Treatment Information

Community	Population est. Total (1987)	Population est. Served	Current level of treatment	Design Flow - MGD	Actual Average Flow - MGD	CSOs	Effluent discharge	Sludge disposal	Primary source of flow
Manchester-by-the-Sea	5,266	3,470	secondary	.67	.56	no	outer Manchester Harbor	trucked out of state	domestic
Beverly	36,000		primary -	(SESD is currently constructing a secondary plant)					
Danvers	25,000		South Essex						
Peabody	48,000	165,000	Sewage	41	27	yes	Salem Sound	Peabody landfill	domestic, industrial, commercial
Salem	39,000		District						
Marblehead	20,000		(SESD)						
	173,260	168,470							

The South Essex Sewage District facility is currently being upgraded to a secondary treatment plant.

The only municipality that is part of the MWRA water supply system is Marblehead. Salem and Beverly have a joint water supply system with a series of reservoirs located in Beverly and Wenham that receive water from small tributaries and pump water from the Ipswich River. Peabody has its own local water supply as does Manchester, which also relies on a well and reservoirs in Hamilton. Danvers shares a water supply system with Middleton with sources located in both communities and one source located in North Reading.

A. Shellfish Beds

All shellfish beds in Salem Sound have been closed for harvesting since the 1960s when direct discharge of sewage and industrial pollution was rampant. Clams and mussels are growing in many areas of Salem Sound but cannot be harvested at this time.

Overlying water which exceeds state criteria for bacteria due to septic systems, sewage treatment plant outfalls, boat waste, and stormwater runoff is currently preventing the opening of shellfish beds for harvesting.

Salem Sound Shellfish Beds and Status as of 07/01/95

	Status*	Open Acres	Closed Acres**
Beverly			
N16.0	P	4,098	
N17.0	P		489
N19.0	P		5
Danvers			
N17.0	P		250
Manchester			
N15.0	P		11,354
N15.1	P		213
N16.0	P		3
Marblehead			
N18.0	P	330	
N18.1	P	41	
Marblehead (con't)			
N19.0	P		2,318
N20.0	P		477
N20.1	P		13
N21.0	P		10,941
N21.1	P		45
Peabody			
N17.0	P		18
Salem			
N17.0	P		590
N18.0	P		140
N18.1	P		424
N19.0	P		5,994

***Status Code:**
A = Approved
CA = Conditionally Approved
CR = Conditionally Restricted
P = Phohibited
MC = Management Closure

****Acres Calculation:** is for the overall surface water area at high tide within the defined growing area. Outer coastal (beach-side) areas generally have clean waters but are not very productive; these areas, usually defined as extending to the 3 mile line, are very large in comparison to the productive, more often closed estuarine areas.

Source: *DMF Data*

B. Beaches

The most frequently visited beaches in the Salem Sound region are Singing Beach in Manchester-by-the-Sea, Devereux and Riverhead Beaches in Marblehead, Sandy Beach in Danvers, and a string of beaches along the Beverly coast, including Mingo, Patch, Rice's, and Dane Street Beaches. In addition, numerous public parks and landings are found along the Sound's coastline.

Salem Sound Coastal Frontage by Community

Community	Total miles of coastal frontage	Miles of coastal frontage publicly owned	Percent of coastal frontage publicly owned
Beverly	10.58	0.94	8.9
Danvers	0.00	0.00	0.0
Manchester-by-the-Sea	11.85	1.82	15.4
Marblehead	16.22	2.69	16.6
Peabody	0.00	0.00	0.0
Salem	11.22	5.63	50.0
Region	49.87	11.08	22.2

C. Other Commercial or Recreational Uses

Salem Sound's always-busy waterfront supports a wide variety of uses. Tourism and water-related activities play an important role in the economies of a number of the Sound's cities and towns. The region has a heavy concentration of boat landings and marinas, along with their attendant service businesses. Several popular excursion boats, as well as a ferry between Gloucester Harbor and Salem Sound, operate during the summer months.

III Community Resource Management Survey

This section contains answers to selected questions from recent EOEA surveys. The answers are summarized here to provide a sense of the steps that Salem Sound communities are taking to protect their resources.

Salem Sound Community Resource Management Survey Answers

	Manchester	Beverly	Danvers	Peabody	Salem	Marblehead
Wetland and Habitat Protection						
Has the community:						
- issued local wetlands guidelines in addition to the Wetlands Protection Act?	Y	N	Y	N	Y	Y (3)
- delineated coastal & inland wetlands?	N	N	Y	N	Y	Y (4)
Groundwater Protection						
Does the community have:						
- stormwater control regulation(s)?	N	Y	N (5)	Y	N	Y
- Board of Health regulation(s) stricter than Title V?	Y	Y	N	N (1)	Y	N
- septic system inspection program?	N	N	N	N	Y	N
- septic system upgrade program?	Y	Y	N	N	N	N
- septic system pumping program?	N	Y	N	N	N	N
Surface and Coastal Water Protection						
Does the community have:						
- flood plain maps (FEMA)	Y	Y	Y	Y	Y	Y
- flood plain zoning	Y	Y	N	Y	N	N
- boat pumpout facilities	Y	Y	Y	N/A	Y	Y
- subdivision stormwater management regulations	N	Y	N	N(2)	N	Y
General Environmental Protection						
Do these boards have professional staff?						
- Planning Board	N	Y	Y	Y	Y	Y
- Conservation Commission	Y	Y	Y	Y	Y	Y
- Board of Health	Y	Y	Y	Y	Y	Y
% relying on septic systems	10-50	< 10	< 10	< 10	< 10	< 10

1) BOH perc tests more restrictive.

2) No management regulations. Planning Board enforces design standards for zero-net run-off increase and 100 year storm.

3) Characterized as "useless" by person who responded.

4) Unofficially mapped.

5) Special conditions in Order of Conditions.

IV Significant Resource Management Issues

Waste Treatment Plants -- The South Essex Sewerage District (SESD) is currently constructing a secondary treatment plant at the existing site and placing a multiport diffuser on its outfall at Great Haste Island. The secondary treatment plant is scheduled to go on-line in August 1997 (see Chapter IV for details). These efforts should result in much improved water quality in Salem Sound. SESD plans to contract for sludge disposal with an out-of-state firm. EPA has identified three CSOs which may require future attention.

The Town of Manchester-by-the-Sea's wastewater treatment plant is currently forbidden from receiving new connections because it is overloaded. The town has been under court order to rebuild and upgrade its treatment plant. In May 1994, the town completed the Facility Plan for upgrading the plant. The upgraded plant is to be located on the existing 1.1 acre site and will be sized to accommodate variations in wastewater flows and loads. The facility will be improved to treat a maximum flow of 1.2 million gallons per day (mgd), averaged monthly; however, the average annual flow and existing facility design flow will remain at 0.67 mgd, thereby remaining in compliance with the requirements of the Ocean Sanctuaries Act (OSA) of 1972. In addition, the town has successfully completed remedial I/I through rehabilitation efforts.

North River -- The North River flows through Salem and Peabody, and had historically been the discharge channel for waste from the many tanneries and other industries along the river. The sediments are heavily contaminated with chromium and other metals, and the site is listed on CERCLIS, the EPA Superfund list of hazardous waste sites which need to be remediated.

Shellfishing -- The shellfishing industry has been non-existent in the Sound since the 1960s when the Commonwealth closed the area to taking shellfish due to poor water quality. Improved water quality may make it possible to harvest shellfish on a restricted basis in the future, and the industry could once again be a feature of Salem Sound and the surrounding communities' economies.

Boat Waste -- Salem, Beverly, Marblehead, and Manchester Harbors contain one of the highest densities of boats per acre in the Commonwealth. The waste created and discharged from marine heads on these boats has also contributed to the closing of the shellfish beds and the degradation of water quality. Last year, funds were granted under the Clean Vessel Act to establish pump-out facilities in all communities and to upgrade the Danvers facility. A number of the communities are using the funds for mobile pump-out stations which will help address the current low frequency of use of existing stationery facilities.

Natural Resource Protection -- Much of the waterfront and watershed of Salem Sound has been developed over the several hundred years since the Colonial era. The few remaining parcels of undeveloped forest, marsh, wetlands, and islands support anadromous fish runs, coastal colonial shorebird nesting habitat, and shellfish growing areas. Efforts to protect these places as special areas need to be encouraged.

Nonpoint Source Pollution -- With the improvements expected in water quality from the secondary treatment system of the South Essex Sewerage District, stormwater runoff will be the primary contributor of pollution to Salem Sound and its tributaries. Municipal programs and homeowner education need to be expanded to address the ubiquitous and incremental damage wrought by nonpoint source pollution.

V Coastal Management and Improvement Activities

A. Mass Bays Program Demonstration Projects and Bays Action Grants

Salem Sound 2000 has received significant support from the Massachusetts Bays Program, the Metropolitan Area Planning Council, and the New England Biolabs Foundation to establish an office and to operate an extensive citizen water quality monitoring program, including analysis and mapping of pollution sources. This project initially involved almost 100 trained local volunteers in walking the entire shoreline. Currently, volunteer monitors regularly sample water quality at strategic locations, and data have been input to a Geographic Information System for analysis of the impacts of land use on water quality. Most recently, volunteer Coastal Water Quality Task Forces were established to work on a number of local water quality improvement projects and public education and outreach initiatives, including storm drain stencilling and production of a Salem Sound video.

The Town of Manchester-by-the Sea received a Bays Action Grant from the Massachusetts Bays Program to publish a list of boat pump-outs that can be found in Salem Sound, including their availability and cost. Most recently, Manchester received a grant to assist with a survey of homeowners with on-site septic systems. The City of Salem received a grant to produce a brochure, to be sent to every resident, that describes actions citizens can take to reduce their impact on the waters of Salem Sound. The Friends of Salem Woods received a grant to upgrade the trail and sign system in the Salem Woods. Venturi Aeration, Inc. received funds to study a new method for treating the wastewater at a tannery in Salem in order to improve the quality of its discharge to the Sound. The Town of Danvers received funds to sponsor a boat pump-out logo contest in the Middle School for the Danversport Yacht Club pump-out, and to design and distribute information on boat waste and pump-outs. The Town of Marblehead received funds for a storm drain stenciling project that is serving as model for other communities.

The Peabody-Essex Museum participates in activities of the Massachusetts Bays Education Alliance, and is conducting teacher training programs and helping to develop school curricula for teachers and students to learn about watersheds and how they drain to embayments.

The Massachusetts Bays Program also contracted with a consulting firm to evaluate costs to Salem Sound communities of management measures to reduce pollutant loads to sediments (Battelle, in progress). The year-long project focused on the cost and effectiveness of Best Management Practices (BMPs) and other stormwater runoff control and reduction strategies.

B. Other Government Programs

A new bridge over the Danvers River is being constructed, with concerns over sediment dredging and disposal having led to extensive sediment analysis.

With support from the Massachusetts Coastal Zone Management Office's Coastal Facilities Improvement Program, public piers have been upgraded at Winter Island (Salem) and in Beverly.

C. Citizen Group Efforts

Salem Sound 2000 is the major watershed organization in the region, and serves as the region's MBP Local Governance Committee. It is a coalition of the Sound's six bordering municipalities, major businesses, and non-profit organizations which are all working together to encourage responsible land use and pollution prevention, and to improve water quality in Salem Sound. This is being done through the collection and dissemination of scientific data, educational programs, and community outreach. Salem Sound 2000 conducts an on-going citizen water quality monitoring program and are involved in a number of educational efforts, including teacher training. Salem Sound 2000 is also working with cities and towns to address stormwater runoff and other nonpoint source pollution problems. As part of its outreach effort, Salem Sound 2000 publishes a quarterly newsletter in collaboration with Eight Towns and the Bay, the Upper North Shore Local Governance Committee.

Other organizations in the area with shared interests include Massachusetts Audubon: North Shore Office, Ipswich River Watershed Association, North River Association, Manchester Conservation Trust, Essex County Greenbelt Association, Friends of Salem Woods, The Trustees of Reservations, National Park Service, and the Peabody-Essex Museum.

Directory of Salem Sound Coastal Projects, Programs, and Sources of Assistance

State/Federal Programs and Agencies	Contact Person and Telephone Number	Project or Program Description
Massachusetts Bays Program	Diane Gould, Executive Director (617) 727-9530	Natural Estuary Program - provides planning technical and financial assistance for the protection of Massachusetts and Cape Cod Bays. Partnership of state/federal and municipal governments.
• Shellfish Bed Restoration Program (MBP, Div. of Marine Fisheries, DEP, Natural Resources Conservation Service)	Deirdre Kimball, Coordinator (617) 727-9530	Collaborative effort by Mass Bays Program, DMF, DEP, and NRCS to remediate storm drain pollution of priority shellfish beds.
• ACEC Program (Area of Critical Environmental Concern)	Leslie Luchonok, ACEC Prog. Mgr. (617) 727-3160	ACEC status provides additional protection to critical resource areas, and creates an ecosystem-based planning and management framework for state and local actions.
• Partners for Wildlife Program (US Fish & Wildlife Service)	Robert Scheirer, Priv. Lands Coord. (603) 225-1411	A federal program providing financial and technical assistance to landowners for wetlands restoration projects.
• Riverways Program (MA Dept. of Fisheries, Wildlife and Env. Law Enforcement)	Maria van Dusen, Joan Kimball (617) 727-1614	Riverways offers guidance documents and technical assistance on local river protection efforts.
• Natural Resources Conservation Service/Community Assistance Unit	Marc McQueen (508) 295-1481	This new technical team helps communities address nonpoint source pollution problems.
• Wetlands Conservancy Program (Department of Environmental Protection)	Charles Costello (617) 292-5704	This state program is charged with mapping coastal and inland wetlands.
• Wetlands Restoration and Banking Program	Christy Foote-Smith, Director (617) 727-9530	A new, statewide EOEA program targeted towards restoring degraded wetlands.
Regional Government Agencies/Programs		
• MBP - Salem Sound 2000 (Lower North Shore Local Governance Committee)	Nancy Goodman, MAPC (617) 451-2770	Regional MBP Committee. Provides technical and financial support to participating communities.
• Department of Environmental Protection	Lawrence Gil Office of Watershed Management (617) 292-5884	Team leader for North Coastal Basin team.
• Coastal Zone Mgmt. Office: North Shore regional assistance	North Shore Coord. (508) 281-7932	CZM develops state coastal zone policy, monitors coastal activities, and provides technical assistance on broad range of coastal issues.

continued

Directory of Salem Sound Coastal Projects, Programs, and Sources of Assistance

Regional Government Agencies/Programs	Contact Person and Telephone Number	Project or Program Description
• Division of Marine Fisheries	Brad Chase Fisheries Biologist Cat Cove Marine Lab Salem (508) 745-3107	Smelt restoration.
	David Chadwick, Fisheries Biologist Newburyport Shellfish Plant (508) 465-3553	The Newburyport biologists test North Shore shellfishing areas for pathogens and PSP.
• Essex County Mosquito Control Project (ECMCP)	Walter Montgomery	ECMCP has expertise in saltmarsh restoration work (Open Marsh Water Management).
• Metropolitan Area Planning Council (MAPC)	Martin Pillsbury, Water Resources Planner	Regional Environmental Planning.
	Joan Blaustein, Land Resource Planner (617) 451-2770	(also assist with bikeways and pathways planning)
• Essex County Regional Services	Tia Costello, Coordinator (508) 741-0201	Recycling, composting, household hazardous waste collection, solid waste management, GIS.
	Thomas O'Leary, County Planner	
Regional Non-Profit Agencies		
• Essex County Greenbelt Association (ECGA)	Ed Becker, Executive Director (508) 768-7241	
• Salem Sound 2000	Sam Cleaves (508) 741-7900	Shoreline surveys, water quality monitoring shellfish bed surveys, storm drain stenciling.
• Peabody-Essex Museum	Jane Winchell Curator Natural History Department, Salem (508) 745-1876	
• Massachusetts Audubon:North Shore Office	Andrea Cooper, Robert Buchsbaum (508) 927-1122	

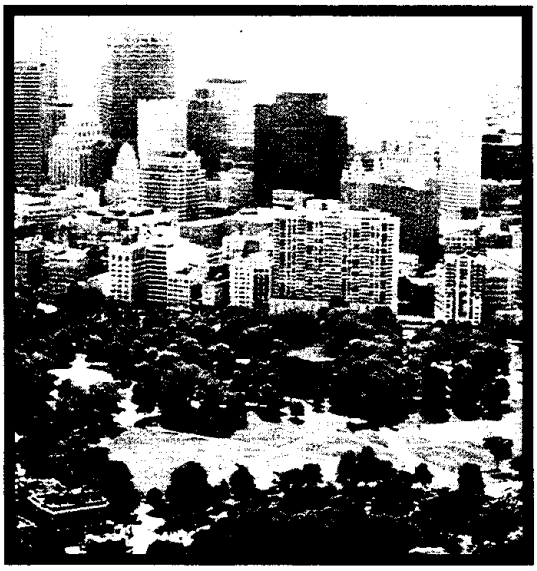
continued

Directory of Salem Sound Coastal Projects, Programs, and Sources of Assistance

Local Efforts	Contact Person and Telephone Number	Project or Program Description
• Manchester Conservation Trust	Helen Bethell Box 1486 Manchester-by-the-Sea	Land conservation.
• Friends of Salem Woods	Ian Lynch 203 Washington St. #158 Salem (508) 741-3465	Maintain trails, conduct nature walks, promote passive recreational use of the woods.

chapter III

Metro Boston Region

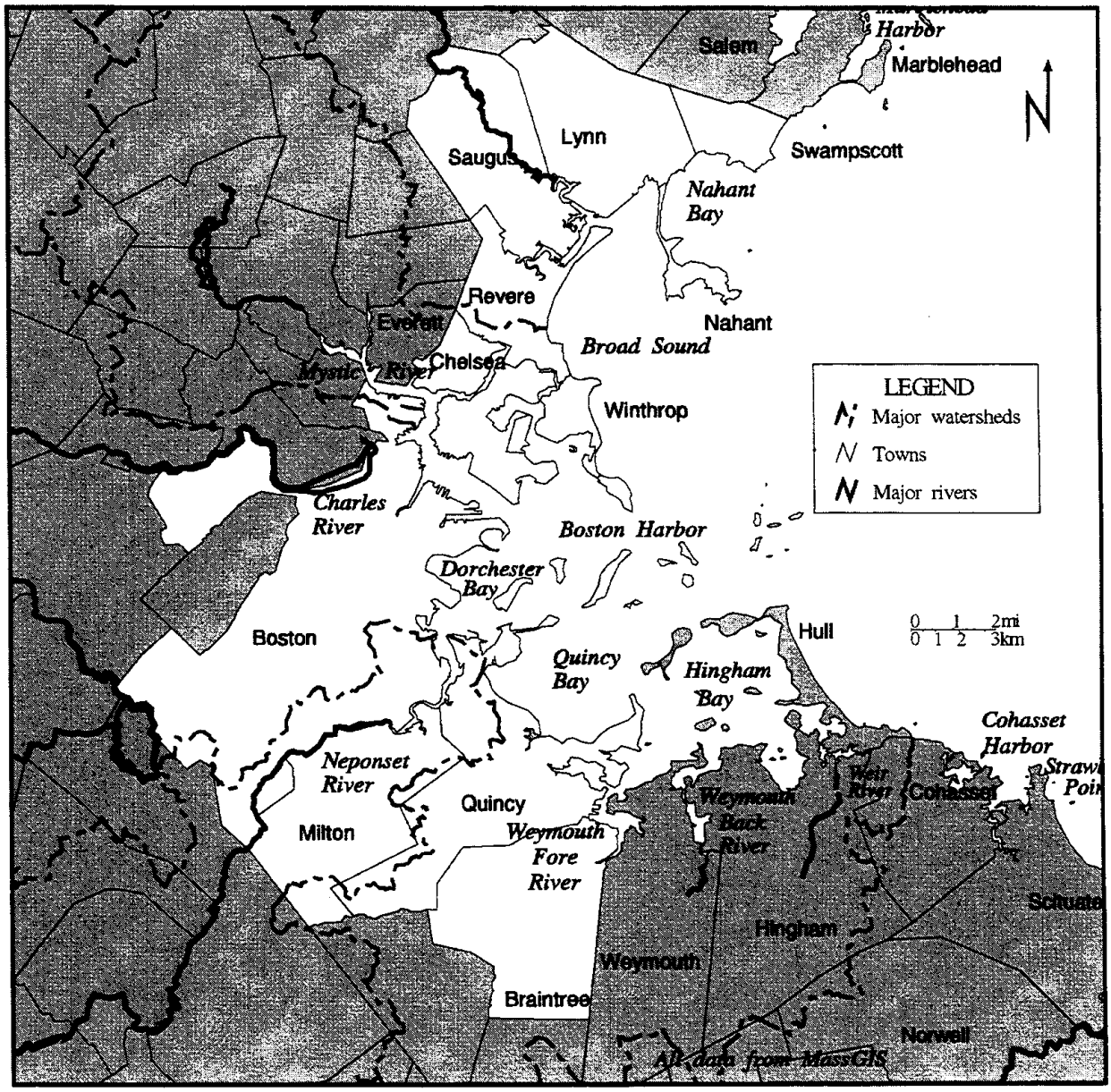


Metro Boston Region

I Description of the Region

A. Map

The Metro Boston region of the Massachusetts Bays Program includes the communities of Swampscott, Lynn, Nahant, Saugus, Revere, Everett, Chelsea, Winthrop, Boston, Milton, Quincy, and Braintree.



B. Physical Characteristics

1) Geology and Soils

Swampscott and Nahant beaches consist of fine to medium-sized sand. Nahant Beach is a depositional feature known as a tombolo, and connects rocky Little Nahant and Nahant "Islands" to the mainland. From Point of Pines, Revere, to Deer Island, adjacent to Winthrop, man-made structures dominate the coastline, with occasional large expanses of tidal flats interspersed throughout. The Boston coastline is highly developed. Old Harbor (part of Dorchester Bay) and most of the Harbor Islands are composed primarily of unconsolidated sands and gravels. The same holds true for Quincy Bay, although the beach is flanked by exposed tidal flats. Most of the coastline of Quincy, Weymouth, Hingham, and Hull Bay is dominated by man-made structures, with occasional limited expanses of gravel beach interspersed throughout.

2) Watersheds and Important Tributaries

This region is fed by several large rivers, including the Charles, Mystic, and Neponset Rivers, as well as the Saugus, Pines, Chelsea, and Fore Rivers. The watershed of the Charles River extends to Milford in Worchester County. The Mystic, Neponset, and Fore River watersheds extend inland to Reading, Foxborough, and Randolph, respectively.

C. Demographic and Economic Characteristics

Most of the Metro Boston communities have experienced only slight population increases or decreases since 1970, with Lynn, Everett, Chelsea, Boston, and Milton experiencing the most notable population declines.

Metro Boston Demographics

Community	Area (sq mi)	1990 Pop. Density (/sq mi)	Year-Round Population 1970	1980	1990	Est. Summer Pop. Inc.*	1990 Avg. Household Income
Swampscott	3.05	4500	13578	13837	13650	-	$50,191
Lynn	10.81	7522	90294	78471	81245	-	28553
Nahant	1.24	3190	4119	3947	3828	-	47212
Saugus	10.99	2322	25110	24746	25549	-	41919
Revere	5.92	7251	43159	42423	42786	-	30659
Everett	3.38	10500	42485	37195	35701	-	30796
Chelsea	2.19	13050	30624	25431	28710	-	25144
Winthrop	1.99	9063	20335	19294	18127	-	37240
Boston	48.42	11365	641071	562994	574283	-	29180
Milton	13.04	1978	27190	25860	25725	-	53130
Quincy	16.79	5078	87966	84743	84985	-	35858
Braintree	13.89	2434	35050	36337	33836	-	44734
Region	131.74	7351	1060981	955278	968425		

* H = High; M = Moderate; L= Low; "-" = None

Source: *1990 U.S. Census Data*

Metro Boston Lobster and Shellfish Landings
(Note: Shellfish data are not shown for communities with fewer than 4 diggers)

Community	1993 Commercial Lobster Landings Pounds	Economic Value	1992 Reported Shellfish Landings Bushels	Major Species
Swampscott	208,531	$606,825	N/A	-
Lynn	183,944	$535,277	N/A	-
Nahant	315,980	$919,502	N/A	-
Saugus	283,760	$825,742	N/A	-
Revere	193,337	$562,610	N/A	-
Everett	---	---	N/A	-
Chelsea	*(included w/ Revere)*	*(included w/ Revere)*	N/A	-
Winthrop	96,954	$282,136	N/A	-
Boston	1,279,602	$3,723,641	N/A	-
Quincy	37,887	$110,251	N/A	-
Braintree	*(included w/ Quincy)*	*(included w/ Quincy)*	N/A	-
Milton	---	---	N/A	-
Totals	2,599,995	$7,565,985		

D. Land Use

Most of the waterfront and much of the surrounding watershed for the Metro Boston region are highly developed as urban and suburban land. Water dependent activities and uses are prevalent along many areas of the coast. Coastal communities are fully or near fully developed while some areas in the upper reaches of the region have large tracts of open space remaining. Few natural areas remain directly along the coastline, although the Metropolitan District Commission (MDC) is working toward completing its Emerald Necklace around the Boston area, with improvements slated for the Neponset River and the Boston Harbor waterfront.

E. Water Quality

DEP's water quality ratings for coastal waters in the Metro Boston area are shown in the following chart. All areas are classified as the less stringent SB designation, except for Nahant Harbor, which has an SA classification. Currently, none of the coastal waters in the area supports its water quality classification. Commonly noted sources of pollution include urban runoff, combined sewer overflows, and waste water treatment plant discharges.

1992 DEP Water Quality Ratings for Metro Boston Rivers and Harbors

River/Harbor	Use * Class	Status**	Pollution Sources
Nahant	SA	NS	Runoff, Wastewater Treatment Plant (WWTP) outfall
Lynn Harbor	SB	NS	Runoff, WWTP, CSO
Pines River	SB	NS	Septic systems
Saugus River	B/SB	NS	Septic systems, runoff, CSOs, industrial outfall
Chelsea River	SB	NS	CSO, urban runoff
Mystic River	SB	NS	CSO, urban runoff
Charles River	B	NS	Urban runoff, CSOs, inplace contamination
Neponset River	SB	NS	CSO, runoff
Furnace Brook	B	NS	Runoff
Weymouth Fore River	SB	NS	Runoff

* **"Use Classes"** are state goals for the river:
S prefix denotes coastal or marine segment
A = public water supply, fishable, swimmable
B = fishable, swimmable
C = fishable

** **Status Codes:**
S = supports all indicated uses
S/T = supports all uses, but threatened
PS = supports some uses
NS = supports no uses

Source: *DEP 305(b) Report*

All of the Metro Boston communities are serviced by central sewage treatment facilities. The following information is summarized from a 1995 report titled "The Status of Municipal Wastewater Treatment and Energy Producing Facilities Discharging to Coastal Waters in Massachusetts" (Richard Zeroka, MCZM). Please refer to this report for more information on coastal municipal sewage treatment plants.

1995 Metro Boston Municipal Sewage Treatment Information

Community	Population est. Total (1987)	Population est. Served	Current level of treatment	Design Flow - MGD	Actual Average Flow - MGD	CSOs	Effluent discharge	Sludge disposal/ reuse	Primary source of flow
Swampscott	13,800								
Lynn	80,000								
Nahant	4,100	125,000	secondary	?	31	yes	Broad Sound	incinerated on site	domestic, comm., ind.
Saugus	25,000	(Lynn)							
Revere	40,000								
Winthrop	19,000								
Everett	37,000								
Chelsea	28,000	920,000	primary	500	500*	yes	Boston Harbor (Deer Island, Nut Island)	Converted to fertilizer pellets in Quincy	domestic, industrial, commercial
Boston	571,000	(MRWA)							
Quincy	90,000								
Braintree	36,000								
Milton	26,000								
Region	969,900	1,045,000							

* Includes sewage flows from all 43 MWRA communities.

The MRWA facilities are undergoing major upgrades. The new primary treatment plant is scheduled for completion in 1995; the secondary treatment plant should be complete in 1999. A new 9-mile long outfall pipe is being constructed to carry effluent into the deeper waters of Massachusetts Bay. The MRWA also plans to address problems with CSOs and excessive inflow and infiltration.

II Coastal Resources

A. Shellfish Beds

The region has both soft shell clam and mussel beds, but the vast majority of these are closed due to pollution. Many communities have some areas available for commercial clam harvesting provided the clams are taken to the depuration plant in Newburyport for filtration. The table below shows the status of shellfish beds by community in the Metro Boston region.

Metro Boston Shellfish Beds and Status as of 07/01-95

	Status*	Open Acres	Closed Acres**
Boston			
GBH2.0	P		1,636
GBH3.0	P		3,677
GBH3.3	P		2
GBH3.4	P		50
GBH3.5	P		94
GBH3.6	MC		28
GBH3.7	MC		144
GBH4.0	P		1,881
GBH5.0	P		1,129
GBH5.10	P		12
GBH5.11	P		42
GBH5.2	CR	100	
GBH5.3	P		106
GBH5.4	CR	70	
GBH5.6	P		15
GBH5.8	P		37
GBH5.9	P		13
GBH6.0	P		4,508
MB13.0	MC		8,723
N28.0	P		6,997
Braintree			
GBH1.0	P		45
GBH1.21	P		43
Cambridge			
GBH4.0	P		5
Chelsea			
GBH4.0	P		176
Everett			
GBH4.0	P		101
Lynn			
N23.0	P		3,394
N24.0	P		0
N26.0	P		435
Milton			
GBH3.0	P		99
Nahant			
N24.0	P		3,001
N25.0	P		6,627
N26.0	P		1,698
Quincy			
GBH1.0	P		940
GBH1.22	P		21
GBH1.23	CR	76	
GBH1.24	P		10
GBH1.25	CR	99	
GBH1.26	CR	72	
GBH1.27	MC		58
GBH2.0	P		3,606
Quincy (cont'd)			
GBH2.1	CR	192	
GBH2.2	P		132
GBH2.3	P		157
GBH2.4	P		90
GBH2.5	CR	127	
GBH2.6	P		17
GBH3.0	P		722
GBH3.1	P		50
GBH3.2	P		79
GBH3.3	P		38
GBH3.4	P		80
Revere			
GBH4.0	P		32
GBH5.8	P		16
N26.0	P		2,546
N26.1	P		71
N26.2	P		97
N26.3	P		43
N26.4	P		57
N26.5	P		30
N26.6	P		58
Saugus			
N26.0	P		164
N26.1	P		72
N26.3	P		43
N26.4	P		1
N26.6	P		28
Somerville			
GBH4.0	P		13
Swampscott			
N21.0	P		33
N22.0	P		6,098
N22.1	P		33
N23.0	P		0
N23.0	P		3,394
Winthrop			
GBH5.0	P		400
GBH5.1	CR	89	
GBH5.12	P		12
GBH5.2	CR	82	
GBH5.5	CR	81	
GBH5.6	P		3
GBH5.7	P		18
GBH5.8	P		29
N25.0	P		714
N26.0	P		495
N26.2	P		100
N27.0	P		4,396

* **Status Code:**
A = Approved
CA = Conditionally Approved
CR = Conditionally Restricted
P = Prohibited
MC = Management Closure

** **Acres Calculation:** is for the overall surface water area at high tide within the defined growing area. Outer coastal (beach-side) areas generally have clean waters but are not very productive; these areas, usually defined as extending to the 3 mile line, are very large in comparison to the productive, more often closed estuarine areas.

Source: *DMF Data*

B. Beaches

Many public beaches exist in the Metro Boston coastal region. Past and present pollution problems, public perception of pollution, and inadequate access have led to many of these beaches not being used to their fullest potential.

The Commonwealth's Joint Commission on the Future of Boston Harbor Beaches recently completed a five-to-seven year plan to improve access to and enjoyment of Boston area beaches from Winthrop to Quincy. In support of this effort, the Commonwealth has appropriated $30,000,000 for capital improvements, to be matched by a $500,000 challenge grant from the City of Boston. Initiated in 1995, the improvements will range from enhancing greenspaces to restoring bath houses and improving traffic circulation.

The following two tables show the Metro Boston region's coastal frontage and beaches by community.

Metro Boston Coastal Frontage by Community

Community	Total miles of coastal frontage	Miles of coastal frontage publicly owned	Percent of coastal frontage publicly owned
Swampscott	3.80	0.33	8.7
Lynn	4.38	1.18	26.9
Nahant	11.49	5.03	43.8
Saugus	0.36	---	0.0
Revere	4.92	2.84	57.7
Everett	---	---	N/A
Chelsea	0.42	---	0.0
Winthrop	9.77	3.19	32.6
Boston	59.77	21.76	36.4
Milton	---	---	N/A
Quincy	25.95	4.58	17.7
Braintree	---	---	N/A
Total	120.86	38.91	32.2

Metro Boston Beaches by Community

Swampscott
- Phillips Beach
- Whales Beach
- Fisherman's Beach
- Kings Beach

Lynn
- Kings Beach
- Lynn Beach

Nahant
- Nahant Beach
- Little Nahant Beach
- Stony Beach
- Forty Steps Beach
- Joseph's Beach
- Pond Beach
- Dorothy Cove
- West Cliff
- Black Rock Beach

Revere
- Revere Beach
- Crescent Beach
- Short Beach

Winthrop
- Short Beach
- Winthrop Beach
- Yirrell Beach
- Donovan's Beach

Boston

(Island Beaches)
- Lovells Island Beach
- Gallops Island Beach
- Georges Island Beach
- Paddocks Island Beach

(Mainland Beaches)

E. Boston--
- Constitution/Orient Heights

S. Boston--
- Pleasure Bay
- Kelley's Landing
- L&M Streets Beaches
- Carson Beach

Dorchester--
- Savin Hill Beach
- Malibu Beach
- Tenean Beach

Quincy
- Nickerson Beach
- Wollaston Beach
- Mound Street Beach
- Town River Bay Beach
- Adams Shore Beach

Braintree
- Smiths Beach

C. Other Commercial or Recreational Uses

Commercial fishing boats operate from almost every coastal community in the region, landing almost every type of commercially available finfish, shellfish, and crustaceans. Recreational boats bring visitors to various Harbor Islands for day trips and overnight visits. Whale-watching fleets also operate from the region. The area also provides wonderful opportunities for observing birds and harbor seals. In addition, the coastal waters of the Metro Boston Region are a busy commercial hub for the transport of cargo, including fuel, foods, and consumer and industrial goods.

Numerous anadromous fish runs in the region provide habitat for smelt, herring, alewife, and shad. Important fish runs include Black Creek and Town River in Quincy, the Weymouth Fore River, the Charles River, the Mystic River, the Saugus River, and the Neponset River.

III Community Resource Management Survey

This section contains answers to selected questions from recent EOEA surveys. The answers are summarized here to provide a sense of the steps that Metro Boston communities are taking to protect their resources.

Metro Boston Resource Management Survey Answers

	Swampscott	Lynn	Nahant	Saugus	Revere	Everett	Chelsea	Boston	Quincy	Milton	Braintree	Winthrop
Wetland and Habitat Protection												
Has the community:												
- issued local wetlands guidelines in addition to the Wetlands Protection Act?	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y
- delineated coastal & inland wetlands?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Groundwater Protection												
Does the community have:												
- stormwater control regulation(s)?	N		?	Y	Y			Y	Y	Y	Y	
- Board of Health regulation(s) stricter than Title V?	A	A	Y	A	A	A	A	A	A	N	A	A
- septic system inspection program?	A	A	A	A	A	A	A	A	A	N	N	A
- septic system upgrade program?	A	A	Y	?	A	A	A	A	A	Y	Y	A
- septic system pumping program?	A	A	N	A	A	A	A	A	A	N	A	A
Surface and Coastal Water Protection												
Does the community have:												
- flood plain maps (FEMA)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
- flood plain zoning	Y	Y	Y	Y	Y	?	?	Y	Y	Y	Y	Y
- boat pumpout facilities	N	Y	N	N	N	Y	N	Y	Y	N	N	N
- subdivision stormwater management regulations	Y	?	?	Y	?	?	N	Y	Y	Y	Y	Y
General Environmental Protection												
Do these boards have professional staff?												
- Planning Board	N	Y	N	N	Y	Y	Y	Y	Y	Y½	Y	N
- Conservation Committee	N	N	N	N	Y	Y	Y	Y	Y	Y½	Y	N
- Board of Health	Y	N	Y½	Y	Y	Y	Y	Y	Y	Y	Y	Y

A = Not Applicable
sewered

Note: *"½" refers to a one-half time employee*

IV Significant Resource Management Issues

The most pressing concerns in the region are the pollutant discharges from the Deer Island sewage treatment plant, CSOs during precipitation events, and stormwater runoff. The MWRA currently is constructing a secondary treatment plant and new effluent outfall (see Chapter IV for details), and has an active program to reduce or treat discharges from CSOs. When completed, these efforts will yield a much cleaner near-shore environment and help to foster a re-connection to coastal waters for many Metro Boston area residents. However, even after CSO controls are implemented, stormwater runoff will continue to be a problem. Other concerns include contaminated sediments in both the inner Boston Harbor and the shipping channel from historical releases of industrial and human wastes. Planned dredging of the area is scheduled to occur in several years, and may cause problems related to resuspension and disposal of the contaminated sediments (see Chapter IV for details).

The National Park Service (NPS) recently released a special study on the resources of the Boston Harbor Islands. This study examined the natural, cultural, and recreational values of the islands, and concluded that the islands meet NPS criteria for inclusion in the National Park System. The study presents a number of management options which include varying degrees of NPS involvement and responsibility. Designation of the Boston Harbor Islands as a National Park must come from Congress, and several members of the Massachusetts delegation are working toward that end.

In addition, significant issues are raised by the proposed Saugus River Flood Control Project (see Chapter IV for details), and the problems associated with *Pilayella littoralis*, a noxious alga which washes up on the beaches of Swampscott, Lynn, Nahant, Revere, and Winthrop, causing foul odors as it decomposes.

V Coastal Management and Improvement Activities

A. Massachusetts Bays Program Mini-Bay Project, Demonstration Projects, and Bays Action Grants

The Fore River in Braintree-Weymouth-Quincy was selected by the Massachusetts Bays Program as a Mini-Bay site. With funding from the MBP, the three communities are for the first time evaluating their shared resource and developing a management plan. The Mini-Bay project is seeking to determine the level of water and sediment contamination from past and present sources. Through this project, a remediation plan, citizen education project, and the Fore River Watershed Association have been created.

Demonstration projects funded in the Metro Boston area include the Lewis Lake project, for which the Town of Winthrop received funding to study the lake, automate the tide gate, educate abutting property owners about water pollution, and monitor late cleanup. The Friends of the Boston Harbor Islands received MBP funding to re-establish native vegetation on the Harbor Islands by building a nursery and stocking the vegetation. The City of Quincy received funding to repair a tidegate that controls the influx of seawater into the stormwater system. Northeastern University's Marine Sciences Center received funding to research the life cycle and influences of *Pilayella littoralis*, a noxious alga that fouls the shoreline and waters of Broad Sound and Nahant Bay.

Bays Action Grants have been awarded for many projects including: Boston: production of a video about Boston's working port; a Thompson Island clean-up; creation of an environmental group in the Malibu Beach area; boat owner education about marine sanitary waste and its proper disposal, conducted by the Boston Harbor Association and Constitution Marina; storm drain stenciling by the Boston Water and Sewer Commission; and publication of tour guides for Boston's Neponset Marsh, Wood Island Bay Marsh, and Belle Isle Marsh. Quincy: curriculum development for wastewater technology; sponsorship of six 8th grade students in an Outward Bound Environmental Leadership course; environmental education project related to the acquisition of two acres of salt marsh and restoration of a third acre by the city; and development of a private afterschool environmental education program. Other funded projects include an environmental education initiative in Lynn, a multimedia presentation on the Rumney Marshes Area of Critical Environmental Concern (ACEC) in Revere, and purchase of five water quality testing kits by the Mystic River Watershed Association.

B. Government Programs

The major water quality improvement project in the region is the secondary treatment plant and new outfall pipe being constructed by the MWRA. The plan developed to eliminate and disinfect CSOs owned by the MWRA and the communities of Boston, Cambridge, Somerville, and Chelsea will provide additional water quality benefits. A number of interim steps taken relative to these have already yielded significant improvements in local water quality. In addition, the Army Corps of Engineers is currently studying the feasibility of placing a tidegate across the Saugus River. The Commonwealth is constructing a third harbor tunnel and depressing the Central Artery, and the shipping channel through Boston Harbor is scheduled for dredging (refer to Chapter IV for more details).

The Metro Boston region has two estuarine ACECs: the Rumney Marshes ACEC and the Neponset River Estuary ACEC. The Rumney Marshes ACEC is approximately 2,800 acres in size, and is located in Boston, Lynn, Revere, Saugus, and Winthrop. The 1,260-acre Neponset River Estuary is located in Boston, Milton, and Quincy. An ACEC Resource Management Plan for the Neponset River Estuary ACEC is currently underway as part of the Executive Office of Environmental Affairs' commitment to working with municipalities, environmental organizations, and residents for the long-term stewardship of ACECs. Portions of three freshwater ACECs are also in the region: the Cranberry Brook Watershed, the Fowl Meadow-Ponkapoag Bog, and the Golden Hills ACECs.

C. Citizen Group Efforts

Watershed associations exist for the Saugus, Mystic, Neponset, Charles, and Weymouth Fore Rivers. The Friends of Boston Harbor Islands, as well as several small beach protection groups, also are active in the region. The Massachusetts Audubon Society recently initiated an environmental education program for students and residents of the City of Lynn. The community representatives on the Metro Boston Local Governance Committee have worked closely with MBP staff on a variety of water quality improvement projects.

Directory of Metro Boston Coastal Projects, Programs, and Sources of Assistance

State/Federal Programs and Agencies	Contact Person and Telephone Number	Project or Program Description
• Massachusetts Bays Program	Diane Gould, Executive Director (617) 727-9530	Natural Estuary Program - provides planning, technical, and financial assistance for the protection of Massachusetts and Cape Cod Bays. Partnership of state, federal, and municipal governments.
• Shellfish Bed Restoration Program (MBP, Div. of Marine Fisheries, DEP, Natural Resources Conservation Service)	Deirdre Kimball, Coordinator (617) 727-9530	Collaborative effort by Mass Bays Program, DMF, DEP, and NRCS to remediate storm drain pollution of priority shellfish beds.
• ACEC Program (Area of Critical Environmental Concern)	Leslie Luchonok, ACEC Prog. Mgr. (617) 727-3160	ACEC status provides additional protection to critical resource areas, and creates an ecosystem-based planning and management framework for state and local actions.
• Partners for Wildlife Program (US Fish & Wildlife Service)	Robert Scheirer, Priv. Lands Coord. (603) 225-1411	A federal program providing financial and technical assistance to landowners for wetlands restoration projects.
• Riverways Program (MA Dept. of Fisheries, Wildlife and Env. Law Enforcement)	Maria van Dusen, Joan Kimball (617) 727-1614	Riverways offers guidance documents and technical assistance on local river protection efforts.
• Natural Resources Conservation Service/Community Assistance Unit	Marc McQueen (508) 295-1481	This new technical team helps communities address nonpoint source pollution problems.
• Wetlands Conservancy Program (Department of Environmental Protection)	Charles Costello (617) 292-5704	This state program is charged with mapping coastal and inland wetlands.
• Wetlands Restoration and Banking Program	Christy Foote-Smith, Director (617) 727-9530	A statewide EOEA program working to restore degraded wetlands.
Regional Government Agencies/Programs		
• MBP - Metro Boston Local Governance Committee	Bill Clark, Nancy Goodman, MAPC (617) 451-2770	Regional MBP Committee - provides technical and financial support to participating communities.
• Coastal Zone Mgmt. Office: Metro Boston regional assistance	Elizabeth Grob, Metro Boston Coord. (617) 727-9530	CZM develops state coastal zone policy, monitors coastal activities, and provides technical assistance on broad range of coastal issues.

continued

Directory of Metro Boston Coastal Projects, Programs, and Sources of Assistance

Regional Government Agencies/Programs	Contact Person and Telephone Number	Project or Program Description
• Division of Marine Fisheries	Brad Chase, Regional Fisheries Biologist/Cat Cove Marine Lab Salem (508) 745-3107 x111	Finfish habitat monitoring and restoration, Boston to Gloucester; also, smelt restoration program.
	David Chadwick, Sr. Fisheries Biologist Newburyport Shellfish Plant (508) 465-3553	The DMF North Shore biologists test coastal waters from Hull to the North Shore for pathogens and PSP.
• Metropolitan Area Planning Council (MAPC)	Martin Pillsbury, Water Resources Planner (617) 451-2770	Regional environmental planning and technical assistance.
	Joan Blaustein, Land Resource Planner (617) 451-2770	(also assist with bikeways and pathways planning)
	Carol Kowalski, Inner Core Coord. (617) 451-2770	Sub-regional group representing 23 communities on planning and policy matters.
• Norfolk County Mosquito Control Project	Endicott S. Norwood 762-3681	NCMCP has expertise in saltmarsh restoration work (Open Marsh Water Management).
Regional Non-Profit Agencies		
• Charles River Watershed Association	Robert Zimmerman, Executive Director (617) 527-2799 Fax: (617) 332-7465	CRWA works to protect and enhance the health, beauty, and enjoyment of the Charles River and its tributaries.
• Neponset River Watershed Association	Ian Cooke, Executive Director (617) 575-0354	Works to protect, enhance, and restore the resources of the Neponset basin.
• Boston Harbor Association	Vivian Li, Executive Director (617) 482-1722	Founded in 1973 to promote a clean, alive, and accessible Boston Harbor.
• Boston Natural Areas Fund	Valerie Burns Director (617) 542-7696	Works to protect, improve, and enhance open space in the City of Boston.

continued

Directory of Metro Boston Coastal Projects, Programs, and Sources of Assistance

Regional Non-Profit Agencies	Contact Person and Telephone Number	Project or Program Description
• Environmental Diversity Forum	Russ Lopez, Executive Director (617) 523-2611	EDF is a coalition of individuals, organizations, environmental activists, neighborhood leaders, and government professionals that brings new attention to the environmental problems that affect communities of color.
• Mystic River Watershed Association	Ed Toomey, President (617) 489-3120	Works to protect water quality and quantity of adjacent riverine lands and habitat.
• Save the Harbor/Save the Bay	Jodi Sugarman, Policy Director (617) 451-2860	Works to foster a positive vision of Boston Harbor and Massachusetts Bay, and to build a broad-based constituency to promote the restoration and protection of these valuable resources.

chapter III

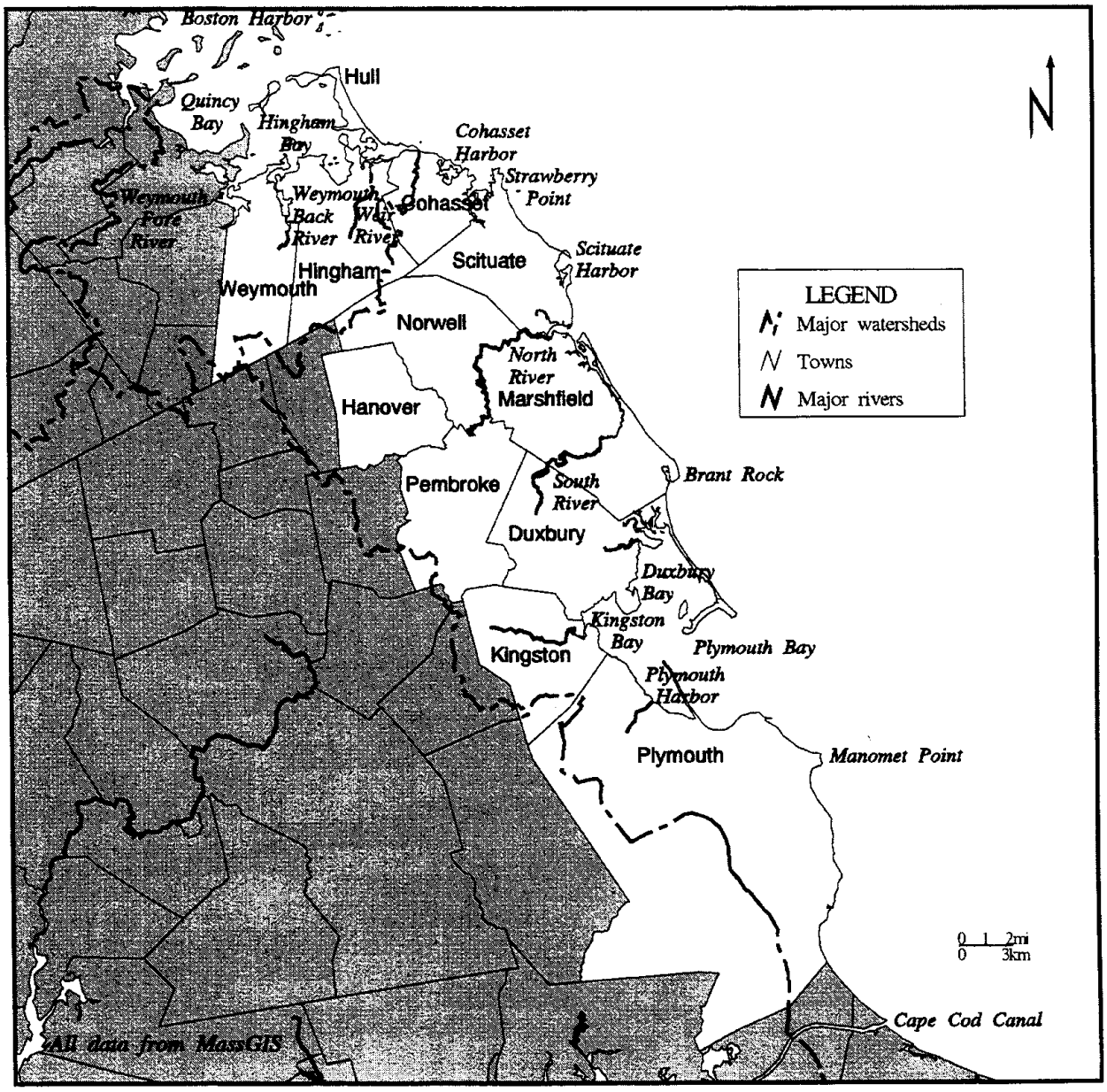
South Shore Region

South Shore Region

I Description of the Region

A. Map

The South Shore region of the Massachusetts Bays Program includes the communities of Plymouth, Kingston, Duxbury, Marshfield, Norwell, Pembroke, Hanover, Scituate, Cohasset, Hull, Hingham, and Weymouth.



B. Physical Characteristics

1) Geology and Soils

From the south end of Point Allerton traveling south along Nantasket Beach, the shoreline consists of sand and gravel beaches. The coastline of South Hull and Cohasset, however, is predominately rocky headlands with small pocket beaches interspersed between.

From Scituate to the Marshfield/Duxbury boundary, the shoreline is highly developed, with beaches of mixed sand and gravel. Further south lies Duxbury Beach, a barrier beach, connecting several deposited land forms called drumlins (Gurnet Point and Saquich Head) to the mainland. The back beach environment of Duxbury Beach (Duxbury Bay and Kingston Bay) consists of marshes interspersed with extensive tidal flats.

Extensive tidal flats also are found in Plymouth Harbor, which is sheltered by Plymouth Beach, a long sandy barrier spit. To the south, the coastal terrain is characterized by numerous glacially-formed small hills and valleys called knob-and-kettle terrain. The beach grain size decreases in a southerly direction from gravel at Rocky Point to fine-medium sand at Sagamore Beach.

2) Watersheds and Important Tributaries

The South Shore has many rivers and streams that make a very complex group of watersheds. Key watersheds that directly impact the coastal resources are as follows:

Weymouth Back River - A major segment of this river is an ACEC. The river has a large shellfish resource, a herring/smelt run, and headwaters in a pond that the town uses for drinking water.

Weir River - This is a tidal estuary that is bordered by Cohasset, Hingham, and Hull. The upper part of the river is an ACEC.

Gulf River - This is a tributary to Cohasset Harbor.

North River - This river has 23 miles of shoreline that is being impacted by 15 towns. It is an important river for shellfish, gamefish, and herring.

South River - This river begins in Duxbury and winds through Marshfield. It has many acres of important shellfish beds.

Other significant waters in the area include: Green Harbor River, Duxbury Bay, Pine Point River, Bluefish River, Back River, Kingston Bay, Jones River, Plymouth Bay, Town Brook, Eel River, and Ellisville Harbor.

C. Demographic and Economic Characteristics

The following tables highlight some of the region's key population and fisheries information.

South Shore Demographics

Community	Area (sq. mi.)	1990 Pop. Density (/sq. mi.)	Year-Round Population 1970	1980	1990	Est. Summer Pop. Inc.*	1990 Avg. Household Income
Plymouth	96.5	472.6	18606	35913	45608	L	$39,886
Kingston	20.4	488.9	5999	7362	9045	L	40872
Duxbury	23.76	583.8	7636	11807	13895	L	63878
Marshfield	28.46	755.5	15223	20916	21531	M	48986
Norwell	20.88	444	7796	9182	9279	L	60462
Pembroke	21.85	667.2	11193	13487	14544	L	46932
Hanover	15.61	763.6	10107	11358	11912	L	54759
Scituate	17.18	975.9	16973	17317	16786	M	52044
Cohasset	9.89	714.6	6954	7174	7075	L	62933
Hull	2.97	488.7	9961	9714	10466	L	37683
Hingham	22.47	880.9	18845	20239	19821	L	60274
Weymouth	17.01	3180.2	54610	55601	54060	L	41586
Region	296.98	788	183903	220070	234022		

* H = High; M = Moderate; L= Low; "-" = None

Source: *1990 U.S. Census Data*

South Shore Lobster and Shellfish Landings
(Note: Shellfish Data not reported for communities with less than 4 diggers)

Community	1993 Commercial Lobster Landings Pounds	Economic Value	1993 Reported Shellfish Landings Bushels	Major Species
Weymouth	30,228	$87,963	N/A	
Hingham	510,193	$1,484,661	N/A	
Hull	294,661	$857,463	77	Sea Clam
Cohasset	465,017	$1,353,199	N/A	
Scituate	582,560	$1,695,249	N/A	
Marshfield	686,611	$1,998,038	N/A	
Duxbury	65,082	$189,388	46,906	Mussel
Kingston	18,239	$53,075	N/A	
Plymouth	783,596	$2,280,264	6,106	Mussel
Region	3,436,187	$9,999,304		

D. Land Use

South Shore communities are predominantly rural-residential, with small community centers dotting the main streets. The region has one major state highway (Route 3) and two major shopping malls. Between 1951 and 1984, when detailed land use inventories were compiled by the state, land development (i.e., residential, commercial, industrial, and transportation uses) increased by 112 percent. Residential growth alone consumed over 15,000 acres of open land, most of which (12,000 acres) was forest. Transportation and commercial uses recorded the highest percent increased of 423% and 305%, respectively. The latest (1985) published land use figures for the region are as follows: 47% forested land, 38% developed land, 8% wetland, 4.5% water and open undeveloped land, and 3% agricultural land.

E. Water Quality

Recent water quality data for selected South Shore rivers and harbors are given in the following table.

1992 DEP Water Quality Ratings for South Shore Rivers and Harbors

River Segment	Use Class*	Status**	Pollutants - Sources
The Gulf	SB	NS	pathogens septic tanks, non-urban runoff
Bound Brook	B	S	
North River (Curtis Crossing Dam to 3A)	SA	NS	organic enrichment/DO, pathogens - septic tanks, non-urban runoff, septage disposal, natural
North River (3A to mouth)	SA	PS	pathogens - septic tanks, non-urban runoff
Herring River	SA	PS	pathogens - septic tanks, recreational activities, non-urban runoff, marinas
Indian Head River	B	PS	nutrients, organic enrichment/DO - municipal point sources, natural
French Stream	B	PS	organic enrichment/DO, nutrients, pathogens - natural, municipal point sources, non-urban runoff
South River (South Res., Duxbury to Main Street, Marshfield)	B	S	
South River (Main Street, Marshfield to North River)	SA	NS	unionized ammonia, pathogens, organic enrichment/DO - non-urban runoff, septic tanks, natural
Green Harbor River	B	PS	pathogens - septic tanks
Jones River (Silver Lake to Wapping Pond, Kingston)	B	S	
Jones River (Wapping Pond to Elm Street, Kingston)	B	S	
Jones River (Elm Street to mouth, Kingston)	SA	NS	pathogens - non-urban runoff
Cohasset Harbor	SA	NS	pathogens - septic tanks, municipal point sources, non-urban runoff
Scituate Harbor	SA	PS	pathogens - source unknown
Green Harbor	SA	NS	pathogens - septic tanks
Duxbury Bay	SA	S	
Plymouth Harbor	SA	NS	pathogens - municipal point sources, urban runoff/storm sewers
Plymouth Bay	SA	NS	pathogens - source unknown
Furnace Brook	S	NS	organic enrichment - urban runoff
Weymouth Fore River	SB	NS	pathogens - urban runoff, storm sewers
Town Brook	S	S	
Monatiquot River	B	NS	pathogens, organic enrichment - septic tanks, urban runoff
Farm River	S	S	
Cochato Rover	B	NS	pathogens, organic enrichment - septic tanks, urban runoff
Trout Brook	S/T	S	oil and grease, priority organics - waste storage, leaks, spills
Weymouth Back River	B	NS	organic enrichment, pathogens, DO - urban runoff, septic systems
Mill River	A	NS	noxious aquatic plants, pathogens, nutrients - septic tanks, urban runoff
Old Swamp River	A	NS	pathogens, organic enrichment/DO - urban runoff, septic systems
Weir River	SA	NS	nutrients, pathogens
Crooked Meadow River	B	NS	organic enrichment, nutrients - urban runoff, septic tanks
Town River Bay	SB	PS	organic enrichment/DO, pathogens - urban runoff

* "Use Classes" are state goals for the river:
S prefix = coastal or marine segment
A = public water supply, fishable, swimmable
B = fishable, swimmable
C = fishable

** Status Codes:
S = supports all indicated uses
S/T = supports all uses, but threatened
PS = supports some uses
NS = supports no uses

Seven of twelve South Shore communities have municipal sewage treatment plants. Sewage from the remaining communities is treated by on-site methods. The following information is summarized from 1995 report titled "The Status of Municipal Wastewater Treatment and Energy Producing Facilities Discharging to Coastal Waters in Massachusetts" (Richard Zeroka, MCZM). Please refer to this report for more information on coastal municipal sewage treatment facilities.

1995 South Shore Municipal Sewage Treatment Information

Community	Population est. Total (1987)	Population est. Served	Current level of treatment	Design Flow - MGD	Actual Average Flow - MGD	CSOs	Effluent discharge	Sludge disposal	Primary source of flow
Weymouth Hingham	55,000 21,000	55,000 part	primary (MWRA)	500	500	no	Boston Harbor (Deer, Nut Islands)	Converted to fertilizer pellets in Quincy	domestic, commercial, industrial
Hull	10,450	10,450	secondary	3.07	1.5	no	Atlantic Ocean	Trucked to Rhode Island	domestic, commercial
Cohasset	7,070	600	secondary	.072	.091	no	James Brook	Trucked to Brockton	domestic, commercial
Scituate	18,000	4,690	secondary	1.0	.80	no	First Herring Brk (North R.)	local landfill	domestic, commercial
Marshfield	21,530	8,000	secondary	2.1	1.2	no	Mass. Bay	local landfill	domestic
Duxbury	13,895	1000 (Marshfield)	secondary	—	—	—	—	—	—
Norwell	9,270	—	onsite	—	—	—	—	—	—
Hanover	11,910	—	onsite	—	—	—	—	—	—
Pembroke	14,544	—	onsite	—	—	—	—	—	—
Kingston	9,000	—	onsite	—	—	—	—	—	—
Plymouth	45,608	14,500	secondary	1.75	1.9	no	Plymouth Harbor	Manomet dump	domestic, commercial, industrial
	237,277	94,240+							

A. Shellfish Beds

South Shore Shellfish Beds and Status as of 07/01/95

	Status*	Open Acres	Closed Acres**
Cohasset			
MB9.0	MC		6,828
MB10.0	A	106	
MB10.1	P		90
MB10.2	P		16
MB10.4	P		12
MB11.0	P		157
Duxbury			
CCB42.0	A	606	
CCB42.1	P		3
CCB43.1	P		74
CCB43.2	A	453	
CCB45.0	A	3,917	
CCB45.1	P		33
CCB45.2	P		1
CCB46.1	A	27	
CCB46.2	CA	33	
CCB46.3	P	3	
CCB46.4	P		22
CCB46.5	P		9
CCB49.0	A	398	
MB1.0	A	11,751	
MB2.0	A	2,154	
Hingham			
GBH1.0	P	1,737	
GBH1.11	CR	52	
GBH1.14	P	83	
GBH1.15	P		9
GBH1.17	P		32
GBH1.19	P		34
GBH1.28	P		19
GBH1.5	CR	1	
GBH1.6	P		33
GBH1.7	CR	79	
GBH1.8	CR	325	
GBH1.9	CR	52	
Hull			
GBH1.0	P		2,160
GBH1.17	P		0
GBH1.2	CR	120	
GBH1.3	CR	100	
GBH1.4	P		23
GBH1.5	CR	77	
GBH1.6	P		35
GBH1.7	CR	0	
GBH2.0	P		898
GBH6.0	P		921
GBH6.1	P		84
MB9.0	MC		0
MB12.0	P		6,201
MB13.0	MC		4,089
Kingston			
CCB42.0	A	194	

	Status*	Open Acres	Closed Acres**
Kingston (cont'd)			
CCB42.2	P		40
CCB43.1	P		58
CCB43.2	A	666	
CCB44.0	P		66
Marshfield			
CCB47	A	7	
MB1.0	A	0	
MB2.0	A	7,360	
MB2.1	P		38
MB2.2	P		268
MB3.0	P		50
MB4.0	A	3,046	
MB5.1	P		178
MB6.0	P		271
Norwell			
MB5.1	P		75
Plymouth			
CCB29.3	A	348	
CCB38.0	A	1	
CCB39.0	A	17,230	
CCB39.1	P		1,090
CCB39.2	P		251
CCB40.0	P		8
CCB41.0	A	22,331	
CCB41.1	P		736
CCB42.0	A	721	
CCB42.1	P		2,203
CCB42.2	P		57
CCB45.0	A	668	
MB1.0	A	1,797	
Scituate			
MB2.0	A	0	
MB4.0	A	10,351	
MB5.1	P		303
MB6.0	P		193
MB7.0	P		206
MB8.0	A	13,541	
	M-	A	294
MB10.1	P		134
MB10.3	CA		18
Weymouth			
GBH1.0	P		1.953
GBH1.10	CR	84	
GBH1.11	CR	0	
GBH1.13	CR	74	
GBH1.14	P		81
GBH1.15	P		22
GBH1.16	P		26
GBH1.18	P		57
GBH1.20	CR	26	
GBH1.21	P		124
GBH1.9	CR	3	

***Status Code:**
A=Approved
CA=Conditionally Approved
CR=Conditionally Restricted
P=Phohibited
MC=Management Closure

**** Acres Calculation:** is for the overall surface water area at high tide within the defined growing area. Outer coastal (beach-side) areas generally have clean water but are not very productive; these areas, usually defined as extending to the 3 mile line, are very large in comparison to the productive, more often closed estuarine areas.

Source: *DMF Data*

B. Beaches

The South Shore region is blessed with many miles of scenic shore frontage, as well as a great number and variety of beaches which offer outstanding opportunities for sunbathing, swimming, fishing, and strolling. The following two tables show the region's coastal frontage and beaches by community.

South Shore Coastal Frontage by Community

Community	Total miles of coastal frontage	Miles of coastal frontage publicly owned	Percent of coastal frontage publicly owned
Cohasset	6.1	0.2	3.3
Duxbury	21.9	0.5	2.3
Hingham	12.2	7.2	59.0
Hull	22.6	5.9	26.1
Kingston	1.9	0.3	15.8
Marshfield	8.8	1.6	18.2
Plymouth	33.4	2.9	8.7
Scituate	19.7	1.7	8.6
Weymouth	8.4	3.6	42.9
Region	135.1	23.8	17.6

South Shore Beaches by Community

Cohasset
- Black Rock
- Pleasant Beach
- Sandy Beach
- Bassing Beach

Duxbury
- Duxbury Beach
- Bay Road Beach
- Eagles Nest Beach
- Harding Hill Beach
- South Duxbury Beach

Hingham
- Hingham Harbor
- Crow Point
- Foley Beach

Hull
- Nantasket
- Crescent Beach
- Black Rock Beach
- Kenberma

Kingston
- Kingston Shores
- Greys Beach
- Rocky Nook Park

Marshfield
- Rexhame Beach
- Fieldston Beach (Sunrise Beach)
- Ocean Bluff Beach
- Brant Rock Beach
- Bluefish Cove
- Green Harbor Beach

Plymouth
- Saquish Beach
- Long Beach
- Warren Cove
- Rocky Point
- Priscilla Beach
- White Horse Beach
- Manomet Beach
- Fisherman's Beach
- Churchill Landing
- Surfside Beach
- Bayside Beach
- Harlow's Landing
- Ellisville Harbor
- Cedarville Landing
- Nelson Beach
- Stephens Field Beach

Scituate
- No. Scituate Beach
- Minot Beach
- Peggotty Beach
- Humarock Beach
- Third Cliff Beach
- Mann Hill Beach
- Hatherly Beach
- Egypt Beach
- Fourth Cliff Beach
- Sand Hills Beach

Weymouth
- Wessagusset

C. Other Commercial or Recreational Uses

The South Shore region is a haven for recreational boating. Nearly every town has at least one marina and town mooring field. All the coastal communities support commercial fleets of lobster, charter, and nearshore fishery boats. Several towns, because of their proximity to Stellwagen Bank, also have major tuna and whale watching fleets, which bring substantial revenues into the communities.

Shellfish, although in plentiful supply, are not readily harvestable (except in Duxbury), due mainly to polluted road runoff and other nonpoint sources of pollution.

III Resource Management

This section contains answers to selected questions from recent EOEA surveys. The answers are summarized here to provide an overview of the steps South Shore communities are taking to protect their important national resources.

South Shore Resource Management Survey Answers

	Weymouth	Hingham	Hull	Cohasset	Scituate	Hanover	Norwell	Pembroke	Marshfield	Duxbury	Kingston	Plymouth
Wetland & Habitat Protection												
Has the community:												
- issued local guidelines in addition to the Wetlands Protection Act?	Y	Y		Y	Y		N	N	N	Y	Y	Y
- delineated coastal & inland wetlands?	Y	Y		Y	Y		Y	N	N	Y	Y	N
Groundwater Protection												
Does the community have:												
- stormwater control regulations(s)?	N	N	N	N	N	Y	Y	Y	Y	N	N	Y
- Board of Health regulation(s) stricter than Title V?	N	Y		Y	Y	Y	Y	N	Y	Y	Y	Y
- septic system inspection program?	Y	N		Y	N	N	N	Y	N	N	N	N
- septic system upgrade program?	Y	Y		N	N	Y	Y	N	N	Y	N	N
- septic system pumping program?	N	N		N	N	N	N	N	N	N	N	N
Surface and Coastal Water Protection												
Does the community have:												
- flood plain maps (FEMA)?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
- flood plain zoning?	Y	Y	Y	Y	Y		N		Y	Y	Y	Y
- boat pumpout facilities?	N	Y	N	N	Y	N	N	N	Y	Y	N	N
- subdivision stormwater management regulations?	N	Y		N	N		N	N	Y	N	Y	Y
General Environmental Protection												
Do these boards have professional staff?												
- Planning Board	Y	Y	Y	N	Y	Y	N	N	Y	Y	Y	Y
- Conservation Committee	Y	Y	Y	Y	Y	N	Y	N	Y	Y	Y½	Y
- Board of Health	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Note: *"½" refers to a one-half time employee.*

IV Coastal Management and Improvement Activities

A. Massachusetts Bays Program Mini-Bay Project, Demonstration Projects, and Bays Action Grants:

The **Weymouth Fore River Mini-Bay Project** is an example of three communities with a common goal of improved water quality. For the first time, the communities of Braintree, Quincy, and Weymouth are working together to determine levels of water and sediment contamination from years of industrial usage. Armed with scientific data, a plan is being developed and implemented to improve water quality and raise the public's consciousness of this unique river.

The **North and South River Watershed Association** has an MBP Demonstration Grant to remediate storm drains affecting water quality in the North River.

The **Bluefish River Demonstration Project,** undertaken by the Town of Duxbury and the Bayswide Committee, is a habitat restoration project aimed at opening shellfish beds by identifying and correcting nonpoint source pollution problems using alternative technologies.

The **Regional Water Quality Lab Service Project**, sponsored by the South Shore Local Governance Committee, is a MBP-funded demonstration project that allows each South Shore community access to a DMF-approved lab. The grant provides the necessary equipment for citizen monitoring groups to conduct upstream sampling to locate potential nonpoint source pollution problems.

Bays Action Grant Award Winners:

Weymouth Waterfront Committee
Hull Conservation
Hanover Chamber of Commerce
Plymouth Marine Mammal Research Center
Hull Public School
Friends of the Weir River Estuary
Atlantic Middle School's Environmental Scholars Project
Hull Environmental High School
Furnace Brook School, Marshfield

B. Government Programs

Coastal Zone Management Office South Shore Regional Assistance	David Janik, So. Shore Coordinator (508) 946-8990
Plymouth County Mosquito Control Project	
Partners for Wildlife/	Robert Schierer
U.S. Fish & Wildlife Service	(603) 225-1411
Natural Resources Conservation Service/ Mass Community Assistance Program	Marc MacQueen (508) 295-1481

C. Citizen Group Efforts

Due to its multitude of embayments, the South Shore has many different citizen groups working on water quality problems. These include the following:

North and South Rivers Watershed Association
Trustees of Duxbury Beach Association
The Gulf Association (Cohasset)
Back River Committee (Hingham and Weymouth)
Bare Cove Park Committee (Hingham)
Bayswide Committee (Plymouth, Kingston, Duxbury)
Jones River Watershed Association
Hull Environmental Services Corp.

D. Areas of Critical Environmental Concern (ACEC)

Currently, there are four ACECs located in the South Shore Region:

Weymouth Back River (Hingham and Weymouth)
Weir River (Cohasset, Hingham, and Hull)
Ellisville Harbor (Plymouth)
Herring River Watershed (Plymouth and Bourne)

E. Anadromous Fish Runs

The South Shore Region has many anadromous fish runs. These include:

Weymouth	Marshfield
Fore River	North River
Back River	South River
Hull-Cohasset	Duxbury
Weir River	Island Creek
Cohasset	Kingston
Gulf River	Jones River
Scituate	Plymouth
Herring Creek	Town Brook, Billington Sea,
Herring River	Eel River, Russell Millpond

F. Coastal Projects

Coastal Projects are broken into three major categories -- monitoring, remediation, and education, with the focus on improved water quality and eventual opening of shellfish beds. All information gathered by these groups is directly coordinated with DMF and their listed town departments.

Bluefish River Demonstration Project -- Bayswide Committee; Town of Duxbury Con Com, BOH, DPW, Shellfish Department, and Building Department; and Kingston Library.

North and South River Watershed Association -- Stormwater Remediation Project; Marshfield DPW, Con Com, and BOH.

North and South River Watershed Association -- Clam seeding project for students, Marshfield Harbormasters Department, Scituate Shellfish Department.

Weymouth Back River Committee -- Puritan Road Tidal Creek, Weymouth Planning Department, DPW, Con Com, Waterfront Committee, Storm Treat Systems, Inc., and NRCS.

Jones River Watershed Association -- Storm drain remediation, in conjunction with the Town of Kingston Highway Department and Conservation Commission.

Bare Cove Park Committee -- Riverbank stabilization and stormwater control, Hingham Con Com and BOH, and U.S. Army Corps of Engineers.

Back River Committee -- Citizen monitoring and the development of the ACEC management plan for the Back River.

Weir River Estuary Park -- Shoreline survey and cataloguing of marine fauna, Hull Environmental Corp., Shellfish Department, BOH, and WWTP; and Cohasset WWTP.

Partners with Wildlife (USFWS) -- A salt marsh restoration project in the towns of Hingham and Scituate, in conjunction with the Plymouth County Mosquito Control Project.

Town of Marshfield -- Salt marsh restoration, Town Pier Road.

Anadromous Fisheries Restoration Projects -- Back River herring run (Weymouth), Gulf River alewife run (Cohasset), and the Jones River (Kingston).

Directory of South Shore Coastal Projects, Programs, and Sources of Assistance

State/Federal Programs and Agencies	Contact Person and Telephone Number	Project or Program Description
• Massachusetts Bays Program	Diane Gould, Executive Director (617) 727-9530	Natural Estuary Program - provides planning, technical, and financial assistance for the protection of Massachusetts and Cape Cod Bays. Partnership of state, federal, and municipal governments.
• Shellfish Bed Restoration Program (MBP, Div. of Marine Fisheries, DEP, Natural Resources Conservation Service)	Deirdre Kimball, Coordinator (617) 727-9530	Collaborative effort by Mass Bays Program, DMF, DEP, and NRCS to remediate storm drain pollution of priority shellfish beds.
• ACEC Program (Area of Critical Environmental Concern)	Leslie Luchonok, ACEC Prog. Mgr. (617) 727-3160	ACEC status provides additional protection to critical resource areas, and creates an ecosystem-based planning and management framework for state and local actions.
• Partners for Wildlife Program (US Fish & Wildlife Service)	Robert Scheirer, Priv. Lands Coord. (603) 225-1411	A federal program providing financial and technical assistance to landowners for wetlands restoration projects.
• Riverways Program (MA Dept. of Fisheries, Wildlife and Env. Law Enforcement)	Maria van Dusen, Joan Kimball (617) 727-1614	Riverways offers guidance documents and technical assistance on local river protection efforts.
• Natural Resources Conservation Service/Community Assistance Unit	Marc McQueen (508) 295-1481	This new technical team helps communities address nonpoint source pollution problems.
• Wetlands Conservancy Program (Department of Environmental Protection)	Charles Costello (617) 292-5704	This state program is charged with mapping coastal and inland wetlands.
• Wetlands Restoration and Banking Program	Christy Foote-Smith, Director (617) 727-9530	A statewide EOEA program working to restore degraded wetlands.
Regional Government Agencies/Programs		
• MBP - South Shore Local Governance Committee	Bill Clark MAPC (617) 451-2770	Regional MBP Committee - provides technical and financial support to participating communities.
• Department of Environmental Protection	Sara Bacon Office of Watershed Management (617) 292-5654	Team leader for South Coastal Basin team.
• Coastal Zone Mgmt. Office: South Coastal regional assistance	Dave Janik, South Coastal Coord. (617) 946-8990	CZM develops state coastal zone policy, monitors coastal activities, and provides technical assistance on broad range of coastal issues.

continued

Directory of South Shore Coastal Projects, Programs, and Sources of Assistance

Regional Government Agencies/Programs	Contact Person and Telephone Number	Project or Program Description
• Division of Marine Fisheries	Ken Reback, Regional Fisheries Biologist Sandwich, MA (508) 888-1155	Finfish habitat monitoring and restoration.
	Frank Germano, Sr. Shellfish Biologist Sandwich, MA (508) 888-4043	The South Shore biologists test shellfish areas for pathogens and PSP.
• Metropolitan Area Planning Council (MAPC)	Martin Pillsbury, Water Resources Planner (617) 451-2770	Regional environmental planning and technical assistance.
	Joan Blaustein, Land Resource Planner (617) 451-2770	(also assist with bikeways and pathways planning)
	Sally Vecchio, Regional Planner So. Shore Coalition-coordinator	South Shore Coalition sub-regional group representing 10 municipalities on planning and policy matters.
• Norfolk County Mosquito Control Project	Dave Lawson Endicott St., Norwood (617) 762-3681	NCMCP has expertise in saltmarsh restoration work (Open Marsh Water Management).
• Old Colony Planning Council	Jim Watson, Comprehensive Planner, Bruce Hughes, Economic Devt Specialist (508) 583-1833	Regional environmental planning and technical assistance.
• Plymouth County Mosquito Control Project	Ray Zucor Kingston (617) 585-5450	PCMPC has expertise in saltmarsh restoration work.
• South Shore Regional Refuse Planning Board	Carol Swete, Solid Waste Planner	Recycling, composting, household hazardous waste collection, solid waste management, GIS.
Citizen Monitoring Efforts		
• No. & So. River Watershed Association	Debbie Lenahan (617) 659-8168	

continued

Directory of South Shore Coastal Projects, Programs, and Sources of Assistance

Citizen Monitoring Efforts	Contact Person and Telephone Number	Project or Program Description
• Jones River Watershed Association	Deborah McKie (617) 585-0702	
• Back River Committee	George Dolan (617) 749-4079	Joint community effort between town of Hingham and Weymouth
• Gulf Association	John Hartshorne (617) 383-0317	

chapter III

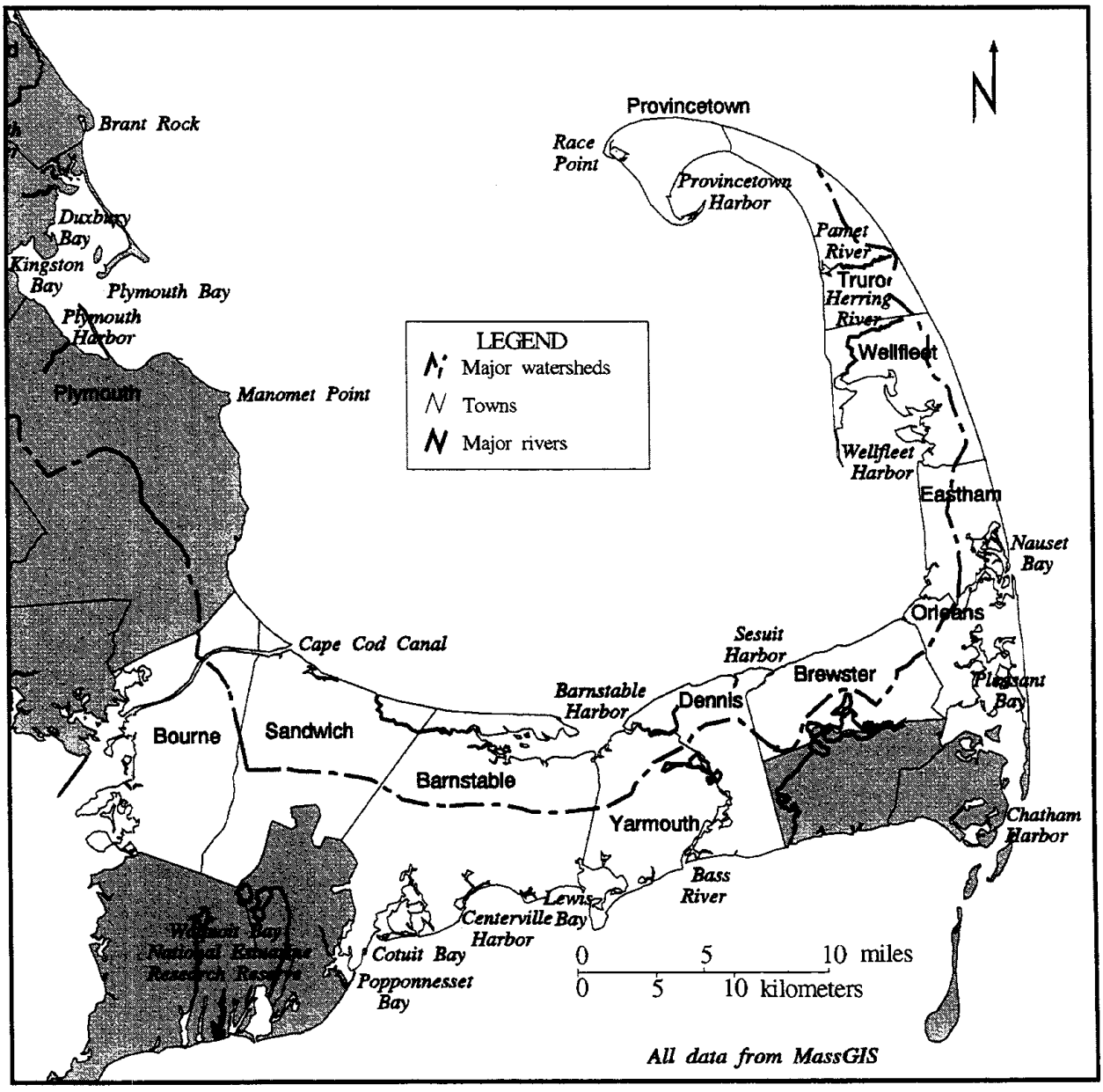
Cape Cod Region

Cape Cod Region

I Description of the Region

A. Map

The Cape Cod region of the Massachusetts Bays Program includes the communities of Provincetown, Truro, Wellfleet, Eastham, Orleans, Brewster, Dennis, Yarmouth, Barnstable, Sandwich, and Bourne.



B. Physical Characteristics

1) Geology and Soils

Cape Cod is a distinctive landform of the Massachusetts coastline, jutting out into the Gulf of Maine and forming the southern boundary of Massachusetts and Cape Cod Bays. Cape Cod is a narrow piece of the coast, no wider than 10 miles and extending eastward approximately 25 miles and then northward 35 miles to Race Point. It is a pile of unconsolidated materials - sands, gravel, silts and clays - left as the last glacier receded around 12,000 years ago. The northern edge of the Cape is the glacial moraine, and provides the Cape with topographic relief, forming hills and valleys. The highest elevation on Cape Cod is approximately 400 feet above mean sea level.

2) Description of the Coastline

The Cape's coastline is composed primarily of sand, and is moving both in the vertical and horizontal directions. The coastline is being affected by sea level rise, as well as by the erosional forces of the wind and water. Parts of the coastline, for example Sandy Neck in Barnstable and the backside of Provincetown, support large sand dunes, some over 30 feet high. Other parts of the coastline, in particular the shorelines of Truro and Wellfleet, are sandy glacial banks, with elevations of 50-80 feet in some areas.

3) Watershed and Important Tributaries

Cape Cod is supported by a sole source aquifer, with 5 distinct lenses of water - bearing sands and gravels. The Cape's groundwater is reflected at the surface in the approximately 353 freshwater ponds, 209 of which are considered by the state to be "great ponds" - 10 acres or larger. In addition, Cape Cod supports more than 100 coastal ponds, estuaries, and embayments. There are numerous brooks and streams, and there are some larger streams called rivers - the Pamet River in Truro, the Herring River in Wellfleet, the Mashpee and Quashnet Rivers in Mashpee and Falmouth, and the Red Brook River in Bourne.

C. Economic and Demographic Characteristics

A special study of the Cape Cod economy valued the economic base at $2 billion in 1985: 27% derived from retirement-based income, 26% tourist-based income, 22% from seasonal residents, and 10% and 15% from manufacturing and miscellaneous sources, respectively. According to the 1990 Census, 83% of employed Cape Cod residents aged 16 and over had one of six occupations: sales (15.1%); professional specialty (15%); administrative support/clerical (14%); service (13.4%); executive/administrative/ managerial (13.1%), and precision production/craft/ repair (12.4%).

All of the Cape Cod towns experience at least a doubling of their population in the summer months. These are seasonal residents, who own property on the Cape, with principal residences elsewhere. Tourists are not accounted for in the "summer" population estimates.

Cape Cod Demographics

Community	Area (sq. mi.)	1990 Pop. Density (/sq mi)	Year-Round Population 1970	1980	1990	Est. Summer Pop. Inc.	1990 Avg. Household Income
Provincetown	9.7	367	2,911	3,536	3,561	H	20,487
Truro	21.1	75	1,234	1,486	1,573	H	28,333
Wellfleet	19.8	126	1,743	2,209	2,493	H	24,149
Eastham	14.0	319	2,043	3,472	4,462	H	31,339
Orleans	14.1	414	3,055	5,306	5,838	H	29,518
Brewster	23.0	367	1,790	5,226	8,440	H	34,935
Dennis	20.6	673	6,454	12,360	13,864	H	27,900
Yarmouth	24.3	871	12,033	18,449	21,174	H	27,222
Barnstable	60.1	681	19,842	30,898	40,949	H	33,411
Sandwich	43.0	360	5,239	8,727	15,489	H	43,500
Bourne	40.9	392	12,636	13,874	16,064	H	34,159
	290.6	461	68,980	105,543	133,907		

* H = High; M = Moderate; L= Low; "-" = None

Source: *1990 U.S. Census Data*

It is fair to say that 75% of the Cape's economic base is dependent upon high quality coastal resources - clean water, good swimming beaches, and the ability to go fishing and engage in boating activities. What draws people to Cape Cod is its environment and its coastal amenities. The 1990 Census figures indicate that approximately 4% of the Cape's total payroll is in the agriculture and fisheries category, with an average annual employment of 1,000 individuals.

Cape Cod Lobster and Shellfish Landings

	1992 Lobster Landings		1993 Reported Shellfish Landings	
Community	Pounds	Economic Value	Bushels	Major Species
Provincetown	171,629	$499,440	488	Sea Clam
Truro	25,808	$75,101	52	Sea Clam
Wellfleet	33,844	$98,486	12,998	Quahog
Eastham	124,098	$361,125	5,558	Sea Clam
Orleans	*(included w/ Eastham)*	*(included w/ Eastham)*	5,457	Mussel
Brewster	103,462	$301,074	N/A	N/A
Dennis	*(incluced w/ Brewster)*	*(included w/ Brewster)*	825	Softshell Clam
Yarmouth	592,209	$1,723,328	937	Softshell Clam
Barnstable	*(included w/ Yarmouth)*	*(included w/ Yarmouth)*	32,134	Sea Clam
Sandwich	1,018,268	$2,963,159	N/A	N/A
Bourne	45,027	$131,028	7,070	Quahog
Region	2,114,345	$6,152,743		

Source: *Division of Marine Fisheries, 1994; data incomplete*

Official statistics on coastal fishing underestimate the value of the industry. This is due in part to the fact that neither individual towns nor the state and federal fishery agencies maintain reliable statistics regarding Massachusetts fishing activities. Reported landings of fish and shellfish for Cape Cod in 1992 were 26.5 million pounds, with an ex-vessel value of approximately $20.7 million. Not accounted for in these statistics is a growing shellfish aquaculture industry, primarily for quahogs and oysters. In 1992, the aquaculture harvest was estimated to be worth $5.8 million to the growers alone. These harvest values are based on the price paid to the fishermen and does not account for the total value of the fishery to the local economy, such as product transportation, monies spent on fuel and supplies, and vessel and gear repairs.

D. Land Use

Cape Cod has become more developed over the last 20 years, as the population, both year-round and seasonal, has increased. From 1971 to 1990, the amount of acres used to support residential development has increased from approximately 42,000 acres to 71,400 acres. Forest land has decreased to 113,000 acres in 1990 from 149,000 acres in 1971. Between 1984 and 1990, residential development consumed 11,000 more acres, and forest land decreased an additional 15,500 acres.

Agricultural activity on Cape Cod (based upon 1987 statistics) has experienced an overall decline on Cape Cod. However, there are some activities that have expanded: the acreage devoted to cranberry cultivation has increased to just under 1,000 acres, with a 20% increase in harvest. Nursery and greenhouse farms expanded to 42, with a doubling in acreage devoted to nurseries, and an increase to 206,000 square feet of greenhouse capacity.

E. Water Quality

All of the Cape's coastal waters in Cape Cod Bay are classified as SA waters by the Department of Environmental Protection. There are local pollution problems within many of the towns' coastal waters, believed to be due primarily to septic systems and, in some locations, boat waste discharge. The only exception is the Cape Cod Canal, which is classified as SB. As pointed out in the section on shellfish beds, there is very little acreage closed to shellfishing along the Bay's shore. Since the Cape's groundwater flows to the coast, maintaining its quality is important to maintaining coastal water quality. Nitrogen from wastewater is of concern, as is the pollution from the Massachusetts Military Reservation (MMR). Eleven pollution plumes have been delineated on the base, seven solvent plumes and four fuel plumes. In addition, there are four other sites contaminated with fuel. Ten of the 11 MMR plumes are moving south-southwest

towards Nantucket Sound; the eleventh is moving west to Buzzards Bay.

Six of the eleven Cape Cod region communities have municipal sewage or septage treatment facilities. The towns of Barnstable and Provincetown are in the wastewater facilities planning process, and both towns are exploring a variety of wastewater treatment options. This involves evaluating the use of a combination of individual on-site technologies, as well as clustered systems, and determining the need for denitrifying or other enhanced treatment technologies.

The chart below summarizes information from a 1995 report titled "The Status of Municipal Wastewater Treatment and Energy Producing Facilities Discharging to Coastal Waters in Massachusetts" (Richard Zeroka, MCZM). Please refer to this report for more information on coastal municipal sewage treatment facilities.

1995 Cape Cod Municipal Sewage Treatment Information

Community	Population est. Total (1987)	Served	Current level of treatment	Design Flow - MGD	Actual Average Flow - MGD	CSOs	Effluent Discharge	Sludge disposal	Primary source of flow
Provincetown	4,000	—	Currently, planning a comprehensive analysis of town's sewage disposal needs and possible solutions						
Truro	1,570	—	Truro and Wellfleet are currently planning a septage/wastewater treatment facility to replace existing septage pits; Wellfleet will possibly sewer downtown.						
Wellfleet	2,490	—							
Eastham	4,462	4,500	treatment facility for pumped on-site septage	.045	below	no	sand filter beds	composting	domestic
Orleans	5,838	6,200							
Brewster	8,440	6,800							
Dennis	13,864	13,500	treatment facility for pumped on-site septage	.12	.031	no	sand filter beds	composting	domestic
Yarmouth	21,174	19,000							
Barnstable	41,000	25,000	secondary	4.2	<4.2	no	discharge to groundwater	composting	domestic
Sandwich	15,490	—	Currently working on plan for septage facility to replace existing septage pits.						
Bourne	16,060	200	Planning to connect 5 - 10,000 residents to Wareham facility						
Region	134,388	75,200							

II Coastal Resources

A. Shellfish Beds

Cape Cod Bay experiences good water quality, as evidenced by the shellfish bed classifications maintained by the Massachusetts Division of Marine Fisheries. Of the 160,744 acres of potential shellfishing area on the Bay side of the Cape, only 132,623 acres were open to harvest as of September 30, 1993. Two shorelines, along the west shore of Wellfleet and the north shore of Barnstable, comprising 25,552 acres, are subject to a management closure, as the Division of Marine Fisheries has not yet completed sanitary surveys for these areas. Areas closed to shellfishing encompass 1,354 acres along the Dennis shoreline and the inner harbor of Provincetown, an area subject to road drainage problems as well as improperly functioning septic systems.

Cape Cod Shellfish Beds and Status as of 07/01/95

	Status*	Open Acres	Closed Acres**
Barnstable			
CCB29.0	P		24
CCB30.0	A	12,223	
CCB30.1	CA	1,607	
CCB31.0	A	1,777	
CCB31.1	CA		212
CCB31.2	CA		69
CCB31.20	CA		35
CCB32.0	P		28
CCB33.0	CA		181
CCB34.0	A	169	
Bourne			
CCB35.0	A	0	
CCB38,0	A	2,832	
Brewster			
CCB20.0	A	10,766	
CCB21.0	P		12
CCB22.0	P		5
CCB24.0	P		8
Dennis			
CCB23.0	A	14,641	
CCB23.2	CA		406
CCB24.0	P		7
CCB25.0	CA		44
CCB27.0	CA		55
Eastham			
CCB9.0	A	16,049	
CCB10.0	P		8
CCB11.0	A	1	
CCB15.0	P		38
CCB16.0	P		35
CCB18.0	P		5
Orleans			
CCB9.0	A	0	
CCB17.0	A	3,261	
CCB18.0	P		5
CCB19.0	P		4
CCB21.0	P		10
Provincetown			
CCB1.0	A	18,251	
CCB2.1	P		17
Provincetown (cont'd)			
CCB2.2	CA		136
CCB3.0	A	1,364	
CCB4.0		2,604	
CCB4.1	P		284
CCB4.3	P		3
CCB5.0	P		130
CCB5.1	P		2
CCB6.0	A	1,275	
Sandwich			
CCB30.0	A	0	
CCB35.0	A	14,986	
CCB36.0	P		26
CCB37.0	P		88
Truro			
CCB1.0	A	425	
CCB3.0	A	4,101	
CCB4.0	A	2,127	
CCB6.0	A	7,880	
CCB7.1S	CA		61
CCB7.2	P		9
CCB7.3	P		21
CCB8.0	A	1,752	
Wellfleet			
CCB8.0	A	12,231	
CCB9.0	A	2,237	
CCB10.0	P		2
CCB11.0	A	5,149	
CCB12	CA	186	
CCB12.2	P		21
CCB12.3	P		1
CCB13.0	A	185	
CCB13.1	CA	59	
CCB13.2	CA		4
CCB14.0	A	573	
Yarmouth			
CCB26.1	A	3,895	
CCB26.2	P		4
CCB27.0	CA		51
CCB28.0	P		29
CCB29.0	P		38

*Status Code:
A = Approved
CA = Conditionally Approved
CR = Conditionally Restricted
P = Prohibited
MC = Management Closure

** Acres Calculation: is for the overall surface water area at high tide within the defined growing area. Outer coastal (beach-side) areas generally have clean waters but are not very productive; these areas, usually defined as extending to the 3-mile line, are very large in comparison to the productive, more often closed estuarine areas.

Source: *DMF Data*

B. Public Beaches

Attendance figures for public parks on the north side of the Cape are an indicator of the attractiveness of the Cape's natural resources. In 1992, Nickerson State Park in Brewster hosted 185,000 visitors, Scusset State Beach in Sandwich 391,000 visitors, and Shawme-Crowell State Park in Sandwich 52,700 visitors. Every town with frontage on Cape Cod Bay has at least one town beach. Access to these for nonresidents is generally regulated by sticker fees and availability of parking. In addition to town beaches, the Cape Cod National Seashore manages Bayside beaches in Wellfleet.

Cape Cod Coastal Frontage by Community

Community	Total miles of coastal frontage	Miles of coastal frontage publicly owned	Percent of coastal frontage publicly owned
Provincetown	24.06	15.07	62.6
Truro	20.43	12.26	60.0
Wellfleet	35.53	20.22	56.9
Eastham	29.88	7.80	26.1
Orleans	31.86	14.03	44.0
Brewster	5.80	4.24	73.1
Dennis	13.98	6.62	47.4
Yarmouth	16.61	1.38	8.3
Barnstable	60.89	9.77	16.0
Sandwich	11.36	0.89	7.8
Bourne	49.23	5.95	12.1
Region	299.63	98.23	32.8

The Massachusetts Public Access Board funded the construction of boat ramps in the Towns of Truro, Wellfleet, Eastham, Dennis, and Barnstable.

C. Other Commercial or Recreational Uses

Cape Cod Bay and Stellwagen Bank are important fishing grounds for the Cape's commercial and recreational fishing fleet. The Bay is fished commercially for flounders, sea clams, quahogs, and by party and charter boats for bluefish and striped bass. Stellwagen Bank is important for the groundfish fishery, as well as a seasonal fishery for bluefin tuna. Rock Harbor in Orleans is home port to the largest charterboat fleet on the Cape, and possibly in Massachusetts, with 25 vessels. Commercial fish and shellfish landings reported for Cape Cod in 1992 were a little over 26.5 million pounds, with a value of approximately $20.7 million. Using an economic multiplier of 4.5, the fishery was worth close to $93 million to the state's economy, much of that remaining on the Cape.

The north shores of the Cape and Cape Cod Bay are popular recreational boating areas. The Army Corps of Engineers estimates that at least 6,500 pleasure craft use the Bay in the summer months. The Cape Cod Canal is utilized by pleasure and commercial craft to travel from southern New England waters into the Gulf of Maine. However, the Canal's major traffic is commercial shipping. In 1992, 5.3 billion gallons of petroleum products alone were shipped through the Canal.

Provincetown, Wellfleet, Orleans, Dennis, and Barnstable have important recreational and commercial harbors that require maintenance dredging. The Bayside waters of Provincetown, Wellfleet, Truro and Brewster are also important for shellfish aquaculture. The Cape towns have the highest number of shellfish grants of any region of the state, and Wellfleet leads with a total of 43 grants, totaling almost 130 acres. The next highest number is in Provincetown, with 36 grants totaling 45 acres (1992 statistics).

Stellwagen Bank and eastern Cape Cod Bay are important feeding and nursery grounds for various species of whales, including the endangered right and humpback whales. A significant whalewatching industry has developed in Provincetown and Barnstable Harbor. In 1992, the Barnstable whalewatch boat carried 34,731 passengers. Statewide, it is estimated that 1.5 million passengers participate in whalewatching each year, generating $23 million in revenue. Most of this activity is based on Cape Cod.

III Community Resource Management Survey

This section contains answers to selected questions from EOEA surveys. The answers are summarized here to provide a sense of the steps that Cape Cod communities are taking to protect their resources.

Cape Cod Resource Management Survey Answers

	Provincetown	Truro	Wellfleet	Eastham	Orleans	Brewster	Dennis	Yarmouth	Barnstable	Sandwich	Bourne
Wetland and Habitat Protection											
Has the community:											
- issued local wetlands guidelines in addition to the Wetlands Protection Act?	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y
- delineated coastal & inland wetlands?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Groundwater Protection											
Does the community have:											
- stormwater control regulation(s)?	N	N	Y	N	Y	N	Y	N	Y	N	Y
- Board of Health regulation(s) stricter than Title V?	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y
- septic system inspection program?	N	N	N	Y	Y	Y	Y	Y	N	N	N
- septic system upgrade program?	N	N	N	Y	Y	Y	Y	Y	Y	N	N
- septic system pumping program?	N	N	N	Y	Y	Y	Y	Y	N	N	N
Surface and Coastal Water Protection											
Does the community have:											
- flood plain maps (FEMA)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
- flood plain zoning	N	N	N	Y*	N	N	N	Y	Y	N	N
- boat pumpout facilities	Y	N	Y	N	Y	N	Y	Y	Y	N	Y
- subdivision stormwater management regulations	N	N	Y	N	Y	N	Y	N	Y	N	Y
General Environmental Protection											
Do these boards have professional staff?											
- Planning Board	N	N	Y	Y	Y	N	Y	Y	Y	Y	Y
- Conservation Commission	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N
- Board of Health	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y

* ACEC only

IV Significant Resource Management Issues

Waste disposal issues top the list of concerns for the Cape's Bayside towns. While various nutrient studies have been conducted on the Cape's south side, there has not been a comprehensive look at whether nitrogen from septic systems is a significant source of nutrients to coastal waters on the north side of the Cape. Data from Provincetown indicate that failing septic systems are a source of contamination to the harbor, and data from the Wellfleet MiniBay project indicate that there may be two problem areas in the inner harbor area. Nitrogen does enter the groundwater from septic systems, and groundwater flows to the edges of the Cape.

A major concern for the Cape Cod Bay communities is the potential long-term impact on the water quality of Cape Cod Bay and town shorelines from the MWRA wastewater treatment facility. There is also concern over the cumulative impact of this facility and other community wastewater discharges into the Bay. Another concern for the Bayside communities is the potential for oil spills from fuel lightering operations off the east entrance of the Cape Cod Canal, as well as from barge and tanker traffic through the Canal. (For a description of the practice of "lightering," please refer to the "Boston Harbor Navigation Improvement Project" discussion in chapter IV.)

Coastal erosion also is a concern for many communities along the Cape Cod Bay shoreline, but in particular for Sandwich, Dennis, Brewster, and Truro. Sandwich and Dennis have numerous structures along their shorelines, and over the past 10 years have experienced significant property damage from coastal storms. Brewster has fewer structures, but also has experienced substantial shoreline erosion in the past four years. The Brewster Conservation Commission is concerned about a possible increase in requests for armouring of the shoreline. Over the past 20 years, many seasonal residences in Cape Cod towns have been converted to year-round occupancy, heightening concern about storm damage and potential pollution from septic systems.

All of the Cape communities are dealing with the consequences of growth and the continuing popularity of the Cape as a summer vacation location. Many feel that the Cape has reached or exceeded its capacity to support the numbers of people who live and visit there.

The Cape Cod Commission, a regional land use planning and regulatory agency was established by state legislation in 1990 to deal with growth management, economic development, and resource protection throughout the Cape. The Commission has the authority to review and assess the benefits and detriments of relatively large development projects, and may approve, disapprove, or approve with conditions projects within its jurisdiction.

The Commission has adopted a Regional Policy Plan to guide development and related decision-making, and all of the Bayside communities are engaged in the preparation of local comprehensive plans (LCPs) consistent with the regional plan. Through their LCPs, the towns examine trends in population growth and changes in land use, natural resources, transportation, and water management, and develop visions for the future. Regional staff from the Massachusetts Coastal Zone Management Office and the Massachusetts Bays Program provide technical assistance to the towns, as well as to the Commission, on coastal and marine resource management issues.

The Barnstable County Extension office is helping the Lower Cape Community Development Corporation to administer a substantial grant from the Executive Office of Communities and Development. The purpose of this grant is to foster the renovation of cranberry bogs and provide incentives to increase aquaculture activity in Cape Cod waters, thereby increasing the number of natural resource-based jobs on the Cape.

V Coastal Management and Improvement Activities

A. Local Stormwater Remediation Projects

Most Cape Cod communities have completed shellfish sanitary surveys conducted by the Division of Marine Fisheries. These surveys identify sources of pollution to shellfish areas. Many of the towns have developed aggressive programs to remediate these problems, and some, for example Barnstable, Yarmouth, and Orleans, have prioritized their drainage systems for remediation, based upon the shellfish/other pubic resource areas affected. Many towns have been working on drainage projects without special appropriations for projects, but as part of their public works department budgets. Examples of town expenditures on these projects include:

Wellfleet - Since 1986, Wellfleet has spent more than $24,000, principally on the installation of leaching catch basins. The town has a bylaw that prohibits stormwater discharges into local waters.

Orleans - Since 1989, Orleans has spent approximately $115,000 on engineering and design work for 4 sites in town. In 1992, the town bonded $370,000 to implement this work. The work, which included the installation of infiltration leaching chambers and gross particle separators, was completed in 1993.

Yarmouth - In 1991, Yarmouth voters approved $200,000 for stormwater remediation, primarily along the Parker's River, supplementing $30,000 the Selectmen had allocated to the town's water quality committee to use for stormwater projects. Much of the work Yarmouth has done has been low technology fixes; for example, replacing existing catch basins with leaching catch basins and installing new catch basins where there previously were none, in order to divert surface runoff away from the estuary.

Dennis - Substantial work has been conducted in the Swan Pond and Swan Pond River area, much of it with regular town funds, not specially appropriated for drainage purposes. A few years ago, the town voted to spend about $100,000 to complete these drainage projects. To date, the town has spent $4,000 of this appropriation on a small infiltration system, and has been awarded a DEP 319 grant of $55,000 for drainage work on Upper County Road.

Barnstable - In 1992-93, Barnstable invested over $195,000 in two stormwater mitigation projects: one in Cotuit Bay and another in Barnstable Harbor. The Cotuit Bay project cost approximately $90,000 and involved the construction of leaching trenches and the installation of leaching chambers to treat stormwater discharging into a productive shellfish area. The site in Barnstable Harbor is a town boat ramp, where the town installed a system to separate sediment from stormwater, and treat the stormwater prior to discharge. The road leading to this site carries a high volume of water and sediment, as it is a steep hill to the water. This project cost was estimated at $105,000, $50,000 of which is construction costs.

B. Massachusetts Bays Program Grant Activity on Cape Cod

Wellfleet - In 1991, the Town of Wellfleet, the Barnstable County Department of Health and the Environment, the Barnstable County Cooperative Extension, and the Cape Cod Commission were awarded a five year grant, funded at $50,000 a year, to gather information on the environmental conditions in Wellfleet Harbor, to conduct socio-economic analyses of the value of fishing activity in the Harbor, and to determine the value people place on water-related activities and good water quality in the Harbor. In addition, the project will support evaluations of various shellfish management techniques. This information will be used to develop a management plan for the Harbor, which will address landuse issues in the watershed as well as coastal and marine resources.

Eastham - In 1992, the Orleans, Brewster, and Eastham Groundwater Protection District was awarded a $9,800 grant for the installation and monitoring of a on-site peat wastewater system at Chapel-In-The-Pines. The grant also supported the conduct of a workshop on the peat system for septic system installers. This project was implemented in cooperation with the Nauset Fellowship, the Barnstable County Department of Health and the Environment, and the Cape Cod Commission.

Yarmouth - In 1991, the Yarmouth Department of Natural Resources was awarded a $879 grant for an environmental study of Mill Pond, conducted in cooperation with the Dennis-Yarmouth Regional High School Science Department.

Barnstable - In 1991, the town was awarded $15,000 to monitor the effectiveness of the stormwater infiltration system installed at the parking lot and boat ramp on Barnstable Harbor (referenced above).

In 1991, the Centerville Elementary School was awarded $370 for an environmental awareness program.

Sandwich - In 1991, Cape Outdoor Discovery was awarded $250 to support a water quality testing program in Scoton Creek.

C. Harbor Management Planning

The Towns of Provincetown, Truro, Wellfleet, Dennis, and Sandwich are engaged in harbor planning efforts, funded in part with grants from the Massachusetts Coastal Zone Management Program.

Provincetown - A major issue in the town's harbor plan is public access, as well as the management of moorings within the harbor.

Truro - Truro has a small harbor, the mouth of the Pamet River, which is scheduled for dredging this fall. An issue of particular concern to the town is the availability and management of moorings.

Wellfleet - Wellfleet is concerned about maintaining a viable town marina and harbor area, as well as protecting the harbor's water quality for the aquaculture business. Wellfleet's harbor generates substantial income for the town; at the end of 1993, Wellfleet had more than $500,000 in its marina enterprise fund. Wellfleet is in the process of evaluating its options for disposal of dredged materials for the harbor dredging project. Wellfleet also has been successfully designated by EPA as the Commonwealth's fifth No Discharge Area (NDA). The designation of an area as an NDA is an option available for communities to address and control boat sewage discharges, and ultimately, to protect the marine environment.

Dennis - The town is interested in making optimal use of their harbor space, as well as protecting the areas of salt marsh within the basin.

Barnstable - The town is working on dredging and dredged material disposal issues associated with Barnstable Harbor. In the process of developing its local comprehensive plan, Barnstable is evaluating land uses around the harbor.

Sandwich - Sandwich is evaluating existing and future land uses adjacent to the harbor, in an effort to maximize the harbor's use and the public's access to this resource. There is a significant commercial fishing fleet that operates from the boat basin, as well as a number of recreational boats. Sandwich owns vacant land adjacent to the harbor which they would like to develop for water dependent use.

D. Areas of Critical Environmental Concern

There are three state-designated Areas of Critical Environmental Concern (ACECs) located on Cape Cod within the Massachusetts Bays watershed. These three ACECs total approximately 24,000 acres and include: the Inner Cape Cod Bay ACEC (2,550 acres), located in Brewster, Eastham, and Orleans; the Sandy Neck/Barnstable Harbor ACEC (8,850 acres), in Barnstable and Sandwich; and the Wellfleet Harbor ACEC (12,350 acres), in Eastham, Truro, and Wellfleet. An ACEC designation provides additional resource protection regarding state regulations, programs, and actions; creates a framework for ecosystem planning and management; and affords an opportunity for increased state-municipal cooperation and collaboration. An ACEC Resource Management Plan is currently being prepared for the Pleasant Bay ACEC, a joint effort of four towns, state and regional agencies, environmental organizations, and residents.

Directory of Cape Cod Coastal Projects, Programs and Sources of Assistance

	Contact Person and Telephone Number	Project or Program Description
Mass Bays Program (MBP) • Wellfleet Bay Mini Bays	George Heufelder Barnstable County Health Department (508) 362-2511 x383	Comprehensive program to evaluate marine water quality and socio-economic values of the harbor and its resources, and to provide information for the town to use in making management decisions regarding future use of the bay.
• Alternative Technologies Assistance Program	Sue Rask Barnstable County Health Department (508) 362-2511 x383	Technical assistance to boards of health and others on alternative on-site wastewater technologies.
• Bays Action Grant Program	Sue Schneider Mass. Bays Program (617) 727-9530 x408	Small grants program ($500-1500) available to communities/individuals/businesses for coastal pollution education and projects.

continued

Directory of Cape Cod Coastal Projects, Programs and Sources of Assistance

	Contact Person and Telephone Number	Project or Program Description
• Cape Cod Coastal Resources Committee	Pat Hughes Cape Cod Commission (508) 362-3828	Regional committee comprised of town appointees. Purpose is to advise county government on coastal issues, share information, and foster regional solutions to coastal problems. Serves as a MBP Local Governance Committee.
Government Programs - Regional		
• Identification of Nitrogen-sensitive coastal waters	Ed Eichner Cape Cod Commission (508) 362-3828	Identify nitrogen sensitive embayments, develop management strategies for controlling nitrogen. Produce manuals for others to use. Funded with 319 monies.
• Wetlands Restoration Projects, associated with regional transportation.	Don Liptack Natural Resources and Conservation Service (508) 362-9332	Use of ISTEA monies to restore wetland areas and improve road drainage along roads and railroads.
• Cape Cod Pathways	Kathy Sferra Cape Cod Commission (508) 362-3828	Development of walking trail across Cape Cod linking existing open space and historic and cultural sites.
• Operation of County Dredge	John Doane Barnstable County Commissioner (508) 362-2511	DEM funds provide dredge equipment for Cape Cod dredging projects, to be operated and maintained by Barnstable County.
• Natural Resources Economic Development Program	Bill Clarke Barnstable County Extension (508) 362-2511 x585	Two year grant to encourage the restoration of abandoned cranberry bogs, and to increase aquaculture activity in the eight lower Cape Cod towns.
• Underground Fuel Tank Program	Charlotte Steifel Barnstable County Health Department (508) 362-2511	Regional program to inventory and test all commercial and residential underground fuel tanks.
• Hazardous Materials Program	Marina Brock Barnstable County Health Department (508) 362-2511 x336	Regional program to assist towns in inventorying hazardous materials and users. Outreach program to businesses on right-to-know laws and proper handling.
• Landfill Monitoring Program	Sean O'Brien Barnstable County Health Department (508) 362-2511 x383	Collection and analysis of groundwater around town landfills.
• Assistance to Boards of Health	George Heufelder Barnstable County Health Department (508) 362-2511 x383	Provide technical assistance to boards of health and fill in for health agents in Cape Cod towns, as needed.

continued

Directory of Cape Cod Coastal Projects, Programs, and Sources of Assistance

	Contact Person and Telephone Number	Project or Program Description
• Evaluation of Waquoit Bay Watershed	Tom Cambareri Cape Cod Commission (508) 362-3828	Determination of groundwater flow affecting Waquoit Bay, and volume of groundwater discharging into the Bay.
• Wellhead Protection Assistance	Gabrielle Belfit Cape Cod Commission (508) 362-3828	Delineation of zones of contribution and appropriate wellhead protection actions.
• Watershed Management Assistance	Tom Cambareri Cape Cod Commission (508) 362-3828	Analysis of land use and protective measures in the towns within the Monomoy Lens of the Cape Cod Aquifer. Recommendations developed for consistent protection of area among the four towns.
• Fisheries Development Planning	Michael Collins Cape Cod Economic Development Council (508) 790-4980	Grant to develop and implement strategic plan for fisheries development, aquaculture, and other water based industries on Cape Cod.
Government Programs - State		
• ACEC Program (Area of Critical Environmental Concern)	Leslie Luchonok ACEC Prog. Mgr. (617) 727-3160	ACEC status provides additional protection to critical resource areas, and creates an ecosystem-based planning and management framework for state and local actions.
• CZM Regional Assistance	Cape Cod Regional Coordinator (508) 362-3828	Assist Cape Cod towns on coastal management issues including harbor planning, and assisting Cape Cod towns with boat pump-out programs.
• DEM - Nickerson State Park Management Plan	Steve Nichol (508) 896-3491	Development and implementation of Master Plan.
• DEM-WBNERR Alternative Technologies Demonstration Project	Christine Gault (508) 457-0495	EPA funded program to install and test alternative on-site wastewater technologies in the Waquoit Bay recharge area.
• DFWELE-MCZM Clean Vessel Act	Cape Cod Regional Coordinator	Funding for boat pump-out facilities for 12 Cape Cod towns.
Government Programs - Federal		
• NRCS - Natural Resource Planning	Don Liptack (508) 362-9332	Work cooperatively with towns and other government agencies on natural resource planning and stormwater control.
• ACOE - marsh restoration project	Dick Heidebrecht (617) 647-8513	Restoration of a 250 acres marsh site in Sagamore in cooperation with Mass. Exec. Office of Environmental Affairs.

continued

Directory of Cape Cod Coastal Projects, Programs and Sources of Assistance

	Contact Person and Telephone Number	Project or Program Description
• ACOE - beach nourishment project	Cathy LeBlanc (617) 647-8564	Evaluation of nourishment of private/commercial beachfront in Truro.
• NPS - Cape Cod National Seashore Management Plan	Mark Taber (508) 349-3785 x206	Development of general management plan for the seashore.
• USFWS - Additions to national wildlife refuge system	Mary Varteresian (413) 253-8450	Evaluation of establishment of refuge adjacent to WBNERR.
• Gulf of Maine Program - Marine Debris Program	Pam Rubinoff MCZM (508) 362-3828	Developing pilot marine debris reduction program in Provincetown, in cooperation with WHOI Sea Grant and MCZM.
Non-Profit Agency Efforts • Association for the Preservation of Cape Cod	Susan Nickerson (508) 255-4142	Action 2000 Agenda for Cape Cod's future; Oversight of MA Military Reservation Pollution Identification and Remediation Program.
• Center for Coastal Studies	Russell DeConti (508) 487-3622	Fishing Net Recycling Project; Water Quality Monitoring of Provincetown Harbor.
• Cape Cod Compact of Conservation Trusts	Mark Robinson (508) 362-9131	Workshops of wetlands protection strategies; included all assistance to land trusts and property owners on land conservation programs.
Citizen Monitoring Efforts • Falmouth Pond Watchers	Tracy Crago WHOI (508) 457-2000 x2398	
• Coalition for Buzzards Bay	Eileen Gunn (508) 759-1140	
• Friends of Meetinghouse Pond	Joe McCarthy (508) 255-4648	